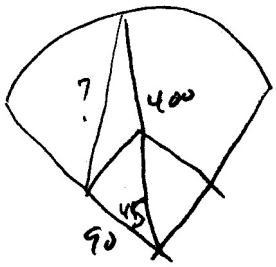
I

Rt Δ = -6

A)

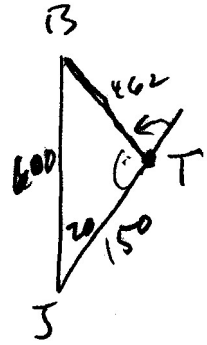



$a^2 = b^2 + c^2 - 2bc\cos A$

$a^2 = 90^2 + 400^2 - 2\cdot 90\cdot 400\cos 45$

$a = 342$ it is 342 feet from Dead center field to 3rd base

B)




$J^2 = 150^2 + 600^2 - 2\cdot 150\cdot 600\cos 20$

$J \approx 462$

$600^2 = 462^2 + 150^2 - 2\cdot 462\cdot 150\cos T$

$\cos T = -.8951$

$T = 153^{\underline{31}}$

$$\begin{array}{r} 17960 \\ 15331 \\ \hline 26^{\underline{29}} \end{array}$$

Wrong angle -1

The captain needs to steer $26^{\circ}\underline{29}$ min to sail to Barbados.

$\frac{462 + 150}{15} = 40.8$ hrs, 40 hrs 48 mins

2 pts

method -3

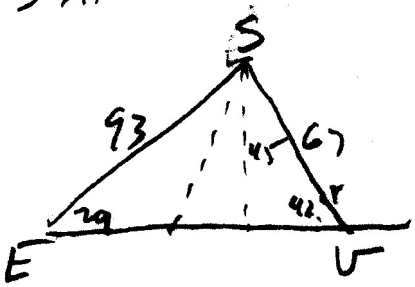
3 pm wed
3 pm thur 24 hrs
3 am Frid 36 hrs
7:48 am Friday

The cruise ship arrives at 7:48 friday morning.

c)

2 Δs.!!

SSA




$S = 108^{\underline{42}}$

$S' = 13^{\underline{18}}$

* $E = 29^{\circ}$

$V = 42^{\underline{18}}$

$V' = 137^{\underline{42}}$

* $e = 67$

* $V = 93$

$s = 93.009$

$s' = 62.596$

$\frac{\sin 29}{67} = \frac{\sin V}{93}$

$\sin V = .6729$

$V = 42^{\circ}\underline{18}$

$\frac{67}{\sin 29} = 138.199$

$138.199 \cdot \sin 108^{\underline{42}} = 130.903$

$138.199 \cdot \sin 137^{\underline{42}} = 62.596$

$93 \sin 29 = 45.087$

2 Δs.

$$\begin{array}{r} 17960 \\ 42\,18 \\ \hline 137\,42 \end{array} \qquad \begin{array}{r} 17960 \\ 71\,18 \\ \hline 108\,42 \end{array}$$

$$\begin{array}{r} 17960 \\ 166\,42 \\ \hline 13\,18 \end{array}$$

Venus is either 131 million miles from EARTH or 32 million miles.

only 1 Δ. -6

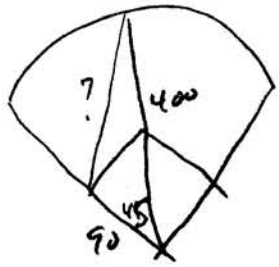
31.79262

$138.199 \sin 13^{\circ}\underline{18}$

I

Rt Δ = -6

A)

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$a^2 = 90^2 + 400^2 - 2\cdot 90\cdot 400\cos 45$

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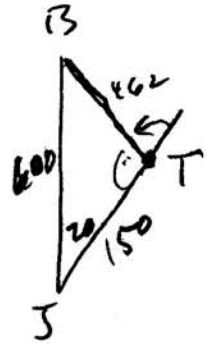
B)

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2 pts

method depart -3

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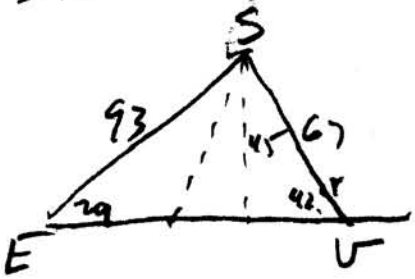
3 pm thur 24 hrs
3 am Frid 36 hrs
7:48 am Friday

The cruise ship arrives at 7:48 friday morning.

c)

2 Δs.!!

SSA

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2 Δs.

$$\begin{array}{r} 17960 \\ 4218 \\ \hline 137^{\underline{42}} \end{array}$$

$$\begin{array}{r} 17960 \\ 7118 \\ \hline 108^{\underline{42}} \end{array}$$

$$\begin{array}{r} 17960 \\ 16642 \\ \hline 13^{\underline{18}} \end{array}$$

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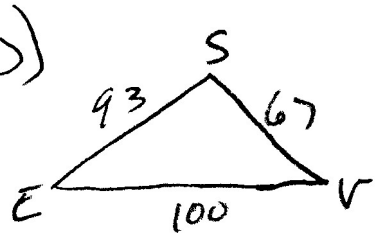
Venus is either 131 million miles from EARTH or 32 million miles.

only 1 Δ. -6

31.7926 2

$138.199 \sin 13^{\circ}\underline{18}$

D) SSS 1 Δ.




$e^2 = v^2 + s^2 - 2vs\cos E$

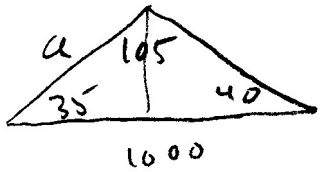
$67^2 = 93^2 + 100^2 - 2\cdot 93\cdot 100\cos E$

$\cos E = .7613$

$E = 40^\circ 25'$

The angle SEV will be $40^\circ 25'$

E) ASA 1 Δ.




$\frac{1000}{\sin 105} = \frac{a}{\sin 40} = \cancel{\frac{b}{\sin 35}} = 1035.276$

$a \sin 35 = \text{height}$, $a = 665.463$ $b = \cancel{593.810}$ not necessary.

height $= 381.693$

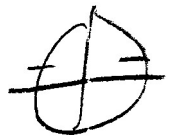
the airplane is about 382' high.

II

$4\sin\theta\cos\theta = 1$

$2\sin 2\theta = 1$

$\sin 2\theta = \frac{1}{2}$



$2\theta = \{30, 150, 390, 510\}$

$\theta = \{15, 75, 195, 255\}$

radians instead of degrees -2

Extra,

$\cos 2\theta - \cos 6\theta = 0$

$\cos(4\theta - 2\theta) - \cos(4\theta + 2\theta) = 0$

$\cos 4\theta\cos 2\theta + \sin 4\theta\sin 2\theta - (\cos 4\theta\cos 2\theta - \sin 4\theta\sin 2\theta) = 0$

$\cos 4\theta\cos 2\theta + \sin 4\theta\sin 2\theta - \cos 4\theta\cos 2\theta + \sin 4\theta\sin 2\theta = 0$

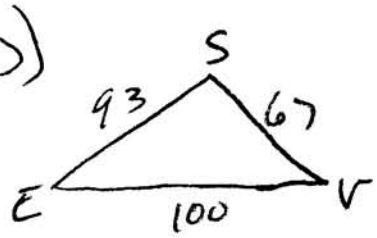
$2\sin 4\theta\sin 2\theta = 0$

$\sin 4\theta = 0$ $\sin 2\theta = 0$

$4\theta = \{0, 180, 360, 540, 720, 900, 1080, 1260\}$

$\theta \{0, 45, 90, 135, 180, 225, 270, 315\}$

D) SSS 1 Δ.

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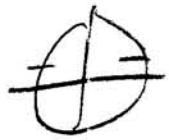

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Extra,

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$\cos 4\theta\cos 2\theta + \sin 4\theta\sin 2\theta - (\cos 4\theta\cos 2\theta - \sin 4\theta\sin 2\theta) = 0$

$\cos 4\theta\cos 2\theta + \sin 4\theta\sin 2\theta - \cos 4\theta\cos 2\theta + \sin 4\theta\sin 2\theta = 0$

$2\sin 4\theta\sin 2\theta = 0$

$\sin 4\theta = 0$ $\sin 2\theta = 0$

$4\theta = \{0, 180, 360, 540, 720, 900, 1080, 1260\}$

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12/12/2000

| 100 | 1 | 2 | 2 |
|---|---|---|---|
| 90 | 6 | 13 | 19 |
| 80 | 10 | 7 | 17 |
| 70 | 3 | 5 | 8 |
| 60 | 2 | 1 | 3 |
| 59 | 0 | 0 | 0 |

102

65

$\frac{1879}{22}$ $\frac{2362}{27}$

85.4 87.5 86.6

Excellent exam.
make changes as shown
on opposite side.

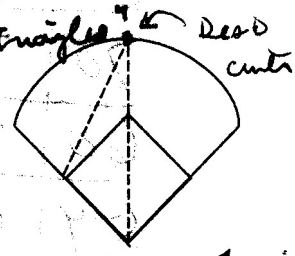
**Honors Trigonometry** Name Trig Ch 5

Copy original problem. Per _____ Date 2000

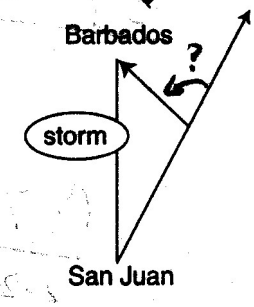
Convince *me* that **you** understand the concept!

# Chapter 5 Exam

**I** For each of the following you will be solving application problems. You need to solve for only the items expressly requested. There may be more than one solution to a question. You are expected to supply all appropriate solutions. Draw the pict. Label it. Write what ever formula you will use and list the numbers you are using. You *must* convince me *you* computed the answer in a proper manner! Answer the question using a complete sentence. (Hint: There are no "no triangles" in this section)




A) On all professional baseball fields, the bases are 90 feet apart. The distance from homeplate to dead center of the Wrigley Field is 400 feet. How far is it from dead center to Third Base? See diagram. (15 pts)



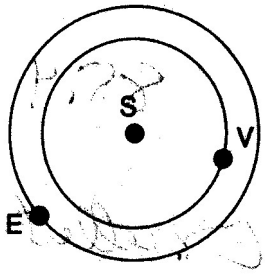

B) On Wednesday ~~a~~ cruise ship leaves port at 3 pm maintaining an average speed of 15 ~~knots~~ miles per hr. in going from San Juan, Puerto Rico, to Barbados, West ~~Indies, a distance~~ of 600 ~~nautical~~ miles. To avoid a tropical storm, the captain heads out to San Juan in a direction of 20 degrees off of ~~direct~~ heading to Barbados. The captain maintains the 15 ~~knot~~ mph speed for 10 hours, after which time the path to Barbados becomes clear of storms. (20 pts tot)

of

1) Through what angle should the captain turn to head directly to Barbados?

what beyond turn

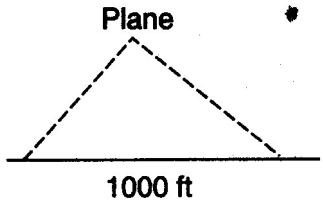
2) To the nearest minute, ~~when~~ does the cruise ship arrive?




C) To an observer on Earth at a particular time, the angle between lines joining Venus to Earth and the Earth to the Sun is 29 degrees. The distance from Venus to the Sun is 67 million miles, whereas the distance from the Earth to the Sun is 93 million miles. To the nearest million miles, how far is Venus from Earth? (20 pts)

D) At another time, the observer sees that Venus is still 67 million miles from the Sun, Earth is still 93 million miles from the Sun and Venus is 100 million miles from Earth. What is the angle between straight lines joining Earth to the Sun and Earth to Venus? (10 pts)

E) An aircraft is spotted by two observers who are 1000 feet apart. As the plane passes over the line joining them, each observer takes a sighting of the angle of elevation to the plane. Jake measures the angle at 35° and Jed measures his angle at 40°. How high is the aircraft? (20 pts)




**II** Solve for $0° \le \theta < 360°$ given: $4\sin\theta\cos\theta = 1$ (15 pts)

**Extra Credit** ---------- **5 pts** ----------

Solve for $0° \le \theta < 360°$ given: $\cos 2\theta - \cos 6\theta = 0$

**Honors Trigonometry** Name Trig Ch 5

Copy original problem. Per _____ Date 2000

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# Chapter 5 Exam

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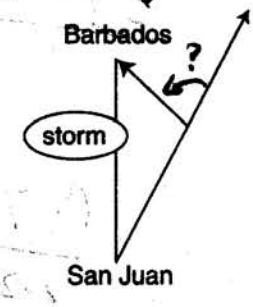


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what bearing time

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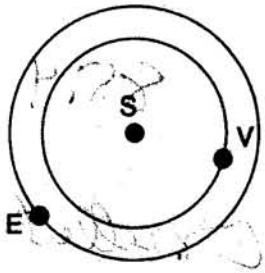


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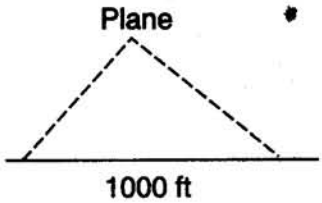
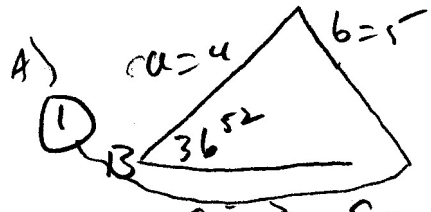



**II** Solve for $0° \le \theta < 360°$ given: $4\sin\theta\cos\theta = 1$ (15 pts)

**Extra Credit ---------- 5 pts ----------**

Solve for $0° \le \theta < 360°$ given: $\cos 2\theta - \cos 6\theta = 0$

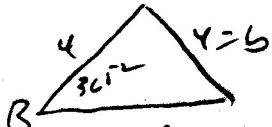
I

A) ① 


1 Δ $\frac{\sin B}{5} = \frac{\sin A}{4}$

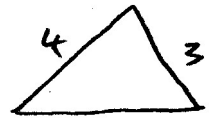
$\sin A = \frac{2.4}{5} = .8$

$A = 28^\circ 12$

② 


1 isoscelus Δ.

so 36 52 = A

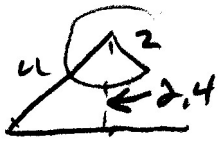
3) 


2 Δs $4 \sin 36^{52} = 2.4$

$\sin A = \frac{2.4}{3} = .8$

$A = 53^\circ 8$ and $126^\circ 52$

$$\begin{array}{r} 179\ 60 \\ 53\ 8 \\ \hline 126\ 52 \end{array}$$

4) 


$b = 2$

NO Δ

B)

① No Δ if $b < 2.4$

② 2 Δs if $2.4 < b < 4$

③ 1 Δ $b \geq 4$ or $b = 2.4$

II

A) ①

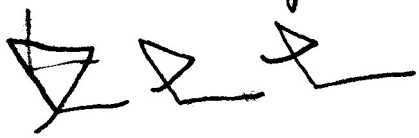

$\frac{\sin 115^{10}}{5} = \frac{\sin A}{4}$

$4\left(\frac{.9050}{5}\right) = \sin A$

$.7240 = \sin A$

$A = 46^\circ 23$

② ③ ④ No Triangle

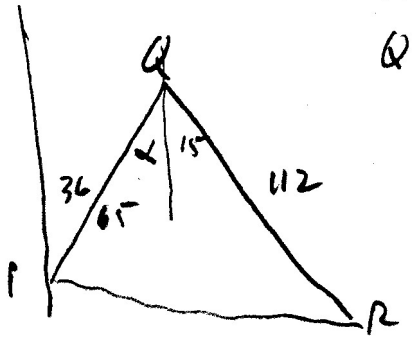


B) ① No Δ if $b \leq 4$

② Never 2 Δs

③ 1 Δ if $b > 4$

III




$\alpha = 36^\circ$

$Q = 51^\circ$

$q = 65^2 + 112^2 - 2 \cdot 65 \cdot 112 \cos 51^\circ$

$4225 + 12544 - 14560 \cos 51^\circ$

$= 9162.904$

$q^2 = 16769$

$q^2 \approx 17.606$

$q = 87.$

The Ship is about 87 miles from P.

IV

a) $2\cos 2\theta \sin\theta + \sin\theta = 0$

$\sin\theta(2\cos 2\theta + 1) = 0$

$\cos 2\theta = -\frac{1}{2}$

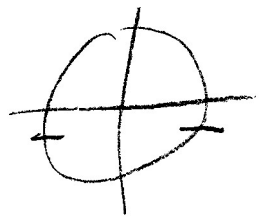
$0, 180$

$2\theta \in \{120, 240, 480, 600$

$\theta \in \{60, 120, 240, 300\}$

$\theta \in \{0, 60, 120, 180, 240, 300\}$

b) $4\sin\theta\cos\theta + 1 = 0$



$2\sin 2\theta + 1 = 0$

$\sin 2\theta = -\frac{1}{2}$

$2\theta \in \{210, 330, 570, 690\}$

$\theta \in \{105, 165, 265, 330\}$

1/4/00

Nathaniel Swerlow 88

1/14/03 Walton Ovalle 52

Honors Trigonometry
Copy original problem.
Convince *me* that **you** understand the concept!

Name Chap 5
Per Trig Date Makeup Exam

# Chapter 5 Make-Up Exam

**I** Triangle ABC is to be constructed from the measures of two sides and a non-included angle.
Given: angle B = 36°52' and side a = 4. (draw the proper picture for each part, of course.) (tot 45 pts)

A) Find all possible measures of angle A when:

1) b = 5 2) b = 4 3) b = 3 4) b = 2

B) Angle B remains 36°52' and side a continues to be 4.

Find the specific range of values for side b for which there will be:
(b is assumed to be positive. Your answer will be similar to: $5 < b \le 7$. Describe to interval which allows the following to exist. If there is no interval which meets the conditions, then state that fact.)

1) no triangle 2) exactly 2 triangles 3) exactly 1 triangle

**II** This is similar to secton I. In secton II, angle B = 115°10' and side a = 4. (draw the proper picture for each part, of course.) (tot 25 pts)

A) Find all possible measures of angle A when:

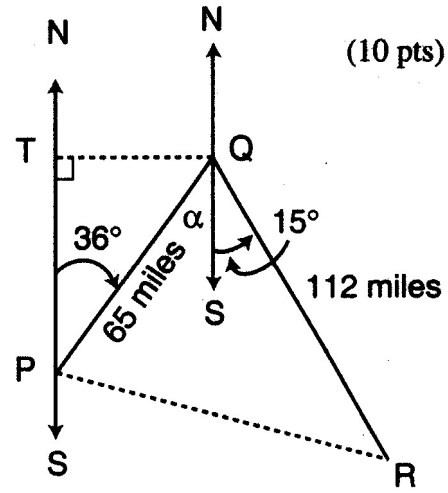
1) b = 5 2) b = 4 3) b = 3 4) b = 2

B) Angle B remains 115°10' and side a continues to be 4.

Find the specific range of values for side b for which there will be:
(b is assumed to be positive. Your answer will be similar to: $5 < b \le 7$. Describe to interval which allows the following to exist. If there is no interval which meets the conditions, then state that fact.)

1) no triangle 2) exactly 2 triangles 3) exactly 1 triangle

**III** A ship leaves port,P, and travels 65 miles on a bearing of N36°E. It then changes course and sails 112 miles on a bearing of S15°E to point R. How far is the ship from the port? (10 pts)




**IV** Solve $\forall\ x\ \varepsilon\ 0^\circ \le \theta < 360^\circ$ (10 pts ea)

a) $2\cos 2\theta \sin\theta + \sin\theta = 0$

b) $4\sin\theta\cos\theta + 1 = 0$

**Honors Trigonometry**

Copy original problem.

Convince *me* that you understand the concept!

Name Trg Ch 5

Per _____ Date 97 83,90

01

# Chapter 5 Exam

**I** For each problem find all missing parts. Each problem defines at least one triangle. (ie. There are no "no triangle" results.) Round lengths to 4 decimal places and degrees to nearest minute. (70 pts tot)

A) $\begin{cases} a = 10 \\ b = 15 \\ c = 20 \end{cases}$

B) $\begin{cases} a = 12 \\ b = 20 \\ C = 30^\circ \end{cases}$

C) $\begin{cases} A = 38^\circ \\ B = 25^\circ \\ b = 15 \end{cases}$

D) $\begin{cases} a = 7 \\ b = 9 \\ A = 35^\circ \end{cases}$

E) $\begin{cases} a = 3 \\ b = 4 \\ c = 5 \end{cases}$

**II** Solve $\forall \ \theta \ \varepsilon \ 0 \le \theta < 360^\circ$ (10 pt ea)

A) $\cos^2(\theta + 60^\circ) - \sin^2(\theta + 60^\circ) = \frac{1}{2}$

B) $\sin\theta + \cos\theta = 1$

**III** Given $0 \le \theta < 90^\circ$, and $\tan^2\theta = \frac{2}{3}$. Find $\csc 2\theta$. No Decimals (10 pts)

**Extra Credit** ---------- **5 pts** ----------

Find the area of each of the triangles in section I.

**Honors Trigonometry**

Copy original problem.

Convince *me* that you understand the concept!

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# Chapter 5 Exam

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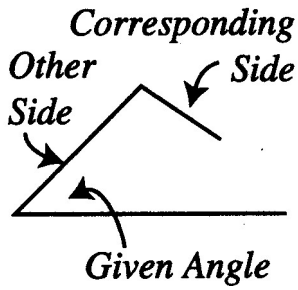
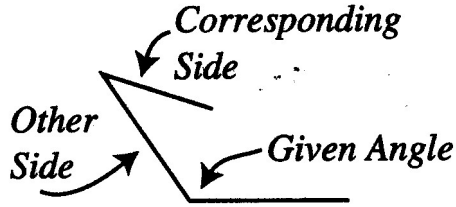
Ambiguous Case

Mr. Mumaugh

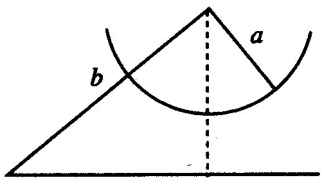


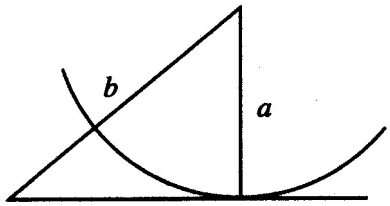

**I** $a < b$

A) $\measuredangle A$ acute

1. $a < b\sin A$ ..... No Triangle

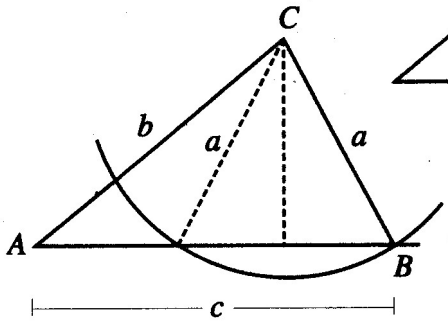



2. $a = b\sin A$

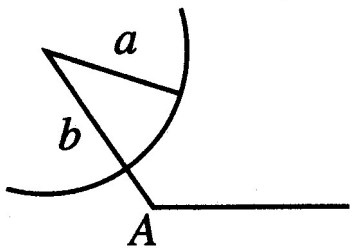



1 Right Triangle

3. $a > b\sin A$ ..... 2 Triangles

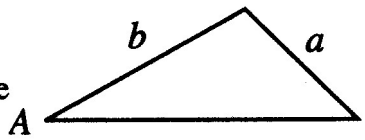



B) $\measuredangle A$ obtuse No Triangle .....




**II** $a = b$

A) $\measuredangle A$ acute 1 Isosceles Triangle

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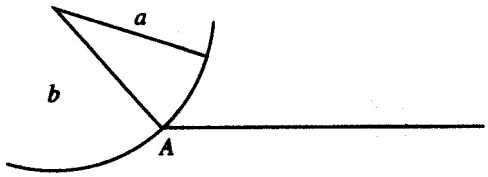
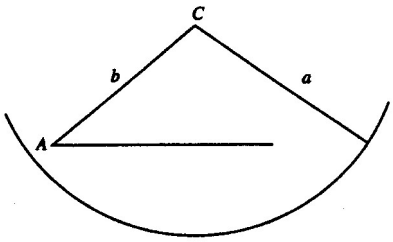
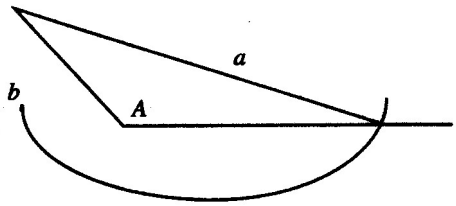



**III** $a > b$ 1 Triangle

A) $\measuredangle A$ Acute




B) $\measuredangle A$ Obtuse .....



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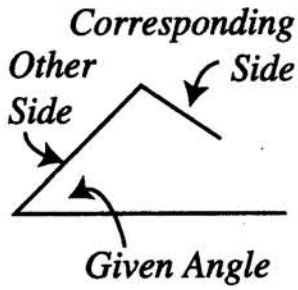
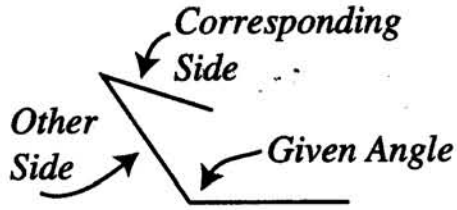
Mr. Mumaugh

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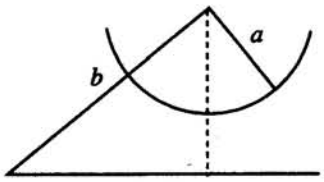
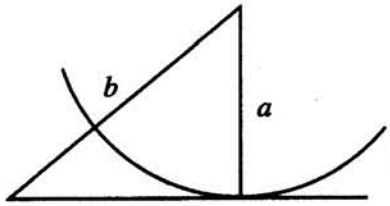
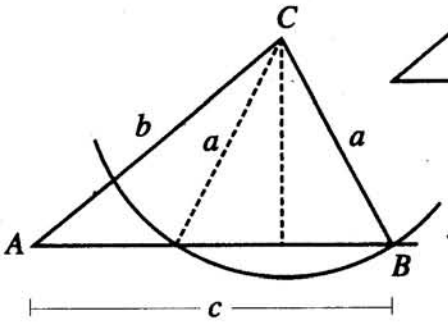
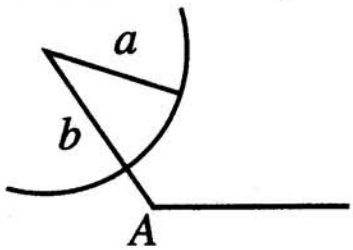
1. $a < b\sin A$  ..... No Triangle

2. $a = b\sin A$  1 Right Triangle

3. $a > b\sin A$  ..... 2 Triangles

B) $\measuredangle A$ obtuse No Triangle ..... 

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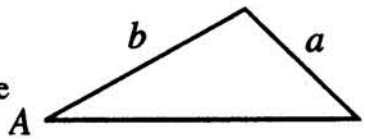
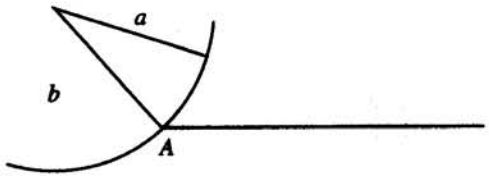
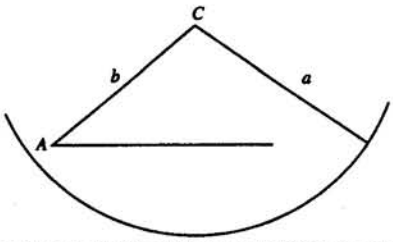
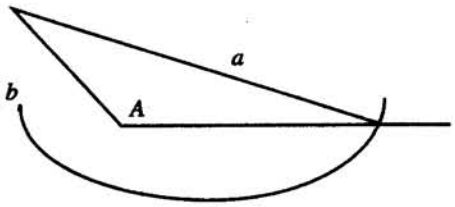
A) $\measuredangle A$ acute 1 Isosceles Triangle 

B) $\measuredangle A$ obtuse No Triangle ..... 

**III** $a > b$ 1 Triangle

A) $\measuredangle A$ Acute 

B) $\measuredangle A$ Obtuse ..... 

I (A) SAS

$A = 42^{12}$

* $B = 67^{40}$

$C = 70^{8}$

* $a = 50$

$b = 68.849$

* $c = 70$

Area $\frac{1}{2}bc\sin A$

$= 1618.37$

$.269 = .269$

$b^2 = a^2 + b^2 - 2ab\cos 67^{40}$

$b^2 = 2500 + 4900 - 7000\cos 67^{40}$

$b^2 = 4740$

$a^2 = b^2 + c^2 - 2bc\cos A$

$2500 = 4740 + 4900 - 9639\cos A$

$\cos A = .7408$

$c^2 = a^2 + b^2 - 2ab\cos C$

$4900 = 2500 + 4740 - 6885\cos C$

$\cos C = .3399$

(B)

* $A = 30°$ RT $\Delta$.

* $B = 60$

$C = 90$

$a = 4$

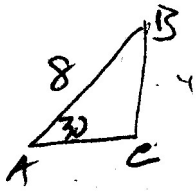
$b = 4\sqrt{3} = 6.9282$

* $c = 8$

Area $= \frac{1}{2} \cdot 4 \cdot 4\sqrt{3}$

$= 8\sqrt{3} = 13.856$

$-.366 = -.366$




C) $A = 62^{11}$

$B = 84^{16}$

$C = 33^{33}$

* $a = 8$

* $b = 9$

* $c = 5$

Area $\frac{1}{2}bc\sin A$

$= 19.9$

$a^2 = b^2 + c^2 - 2bc\cos A$

$64 = 81 + 25 - 90\cos A$

$\cos A = .4667$

$b^2 = a^2 + c^2 - 2ac\cos B$

$81 = 64 + 25 - 80\cos B$

$\cos B = .1$

$c^2 = a^2 + b^2 - 2ab\cos C$

$25 = 64 + 81 - 144\cos C$

$\cos C = .8333$

D) $A = 111^{19}$

$A' = 8^{41}$

* $B = 30$

$C = 38^{41}$

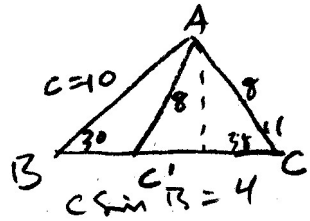
$C' = 141^{19}$

$a = 14.91$

* $a' = 2.42$

* $b = 8$

* $c = 10$




$c\sin B = 4$

$\frac{\sin B}{b} = \frac{\sin A}{a} = \frac{\sin C}{c}$

$\frac{1}{16} = \frac{\sin A}{a} = \frac{\sin C}{10}$

$.0625$

$.6250 = \sin A$

$17960$
$6841$
$A = 171^{19}$

$17960$
$3841$
$141^{39}$
$C'$

$17960$
$171.19$
$8.41 = A'$

$16\sin 111^{19} = a$

$16\sin 8^{41} = a'$

Only 1 $\Delta$. and correct

$-10$

Area $\frac{1}{2}ac\sin B$

$37.275$

and

$6.05$

No area 2 pts per problem (total 10 pts)

I (A) SAS

$A = 42^{12}$

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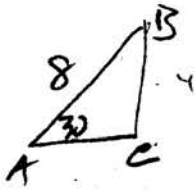


Area $= \frac{1}{2} \cdot 4 \cdot 4\sqrt{3}$

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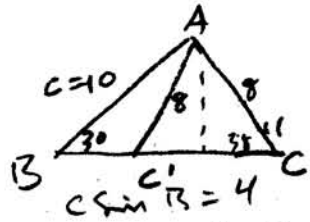


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$\frac{\sin B}{b} = \frac{\sin A}{a} = \frac{\sin C}{c}$

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$16\sin 8^{41} = a'$

Only 1 $\Delta$. and correct

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Area $\frac{1}{2}ac\sin B$

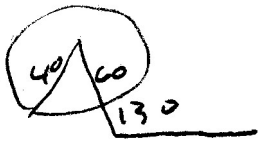
$37.275$

and

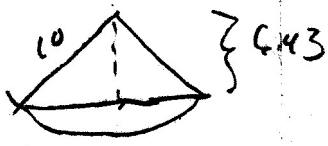
$6.05$

No area 2 pts per problem (total 10 pts)

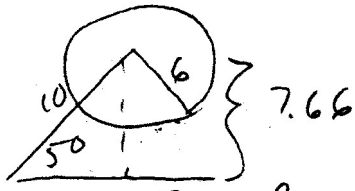
II A) None




B) 1 Isoc Δ




C)

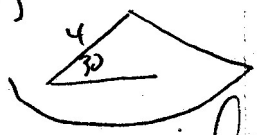



0 Triangles

D)

2 ΔS

E)

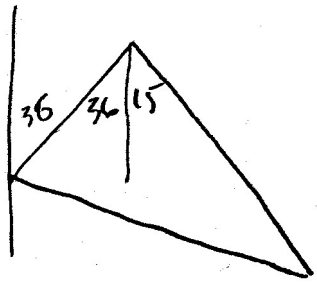



1 Triangle

f) $\measuredangle C = 0°$

NO Δ.

III




$a^2 = b^2 + c^2 - 2bc\cos A$

$a^2 = 65^2 + 112^2 - 2(65)(112)\cos 51°$

$4225 + 12544 - 9162.9$

$a^2 = 7606.1$

$a = 87.2$ miles

a) $d = 36$

B) $51°$

the ship is 87 miles from Port.

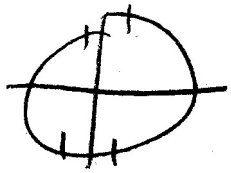
Extra.

$\cot\theta = \tan(2\theta - 270°)$

$= \dfrac{\sin(2\theta - 270°)}{\cos(2\theta - 270°)}$

$= \dfrac{\sin 2\theta \overset{0}{\cos 270°} - \sin 270° \cos 2\theta}{\cos 2\theta \underset{0}{\cos 270} + \sin 2\theta \sin 270}$

$= \dfrac{\cos 2\theta}{-\sin 2\theta}$



$\dfrac{\cos\theta}{\sin\theta} = \dfrac{\cos^2\theta - \sin^2\theta}{-2\sin\theta\cos\theta}$

$-2\cos^2\theta = \cos^2\theta - \sin^2\theta$

$= 2\cos^2\theta - 1$

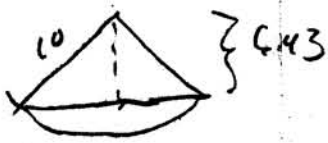
$4\cos^2\theta = 1$

$\cos\theta = \pm\frac{1}{2}$

$\theta \in \{60, 120, 240, 300\}$

II A) None

B) 1 Isoc Δ



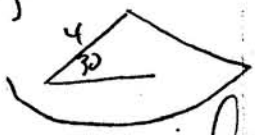

C)

0 Triangles

D)

2 ΔS

E)

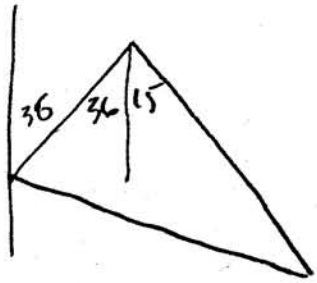



1 Triangle

f) $\measuredangle C = 0°$

NO Δ.

III




$a^2 = b^2 + c^2 - 2bc\cos A$

$a^2 = 65^2 + 112^2 - 2(65)(112)\cos 51°$

$4225 + 12544 - 9162.9$

$a^2 = 7606.1$

$a = 87.2$ miles

a) $\measuredangle = 36$

B) $51°$

the ship is 87 miles from Port.

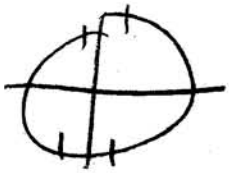
Extra.

$\cot\theta = \tan(2\theta - 270°)$

$= \dfrac{\sin(2\theta - 270°)}{\cos(2\theta - 270°)}$

$= \dfrac{\sin 2\theta \overset{0}{\cos 270°} - \sin 270° \cos 2\theta}{\cos 2\theta \underset{0}{\cos 270} + \sin 2\theta \sin 270}$

$= \dfrac{\cos 2\theta}{-\sin 2\theta}$



$\dfrac{\cos\theta}{\sin\theta} = \dfrac{\cos^2\theta - \sin^2\theta}{-2\sin\theta\cos\theta}$

$\theta \in \{60, 120, 240, 300\}$

$-2\cos^2\theta = \cos^2\theta - \sin^2\theta$

$= 2\cos^2\theta - 1$

$4\cos^2\theta = 1$

$\cos\theta = \pm\frac{1}{2}$

12/17/02

| | 2 | 3 | T |
|---|---|---|---|
| 100 | 3 | 3 | 6 |
| 90 | 10 | 8 | 18 |
| 80 | 6 | 6 | 12 |
| 70 | 4 | 6 | 10 |
| 60 | 0 | 3 | 3 |
| 59 | 1 | 0 | 1 |

100

58

2113 / 24 = 880

2222 / 26 = 85.5

86.7

Great exam!

The only failure didn't do any HW. He had all answers correct but showed no work & tagged him 8/15 each

# Honors Trigonometry

Name Trig Ch 5

Per _____ Date 2002

Copy original problem.

Convince *me* that **you** understand the concept!

## Chapter 5 Exam

All degree measurements are to be to nearest minute and length measurements to nearest hundredth.

**I** Solve for all missing parts of the given triangle ABC: State the area of each triangle. (15 pts ea)

A) $B = 67°40'$, $a = 50$, $c = 70$

B) $B = 60°$, $c = 8$, $A = 30°$

C) $a = 8$, $b = 9$, $c = 5$

D) $B = 30°$, $c = 10$, $b = 8$

**II** State whether there are ***none, one, or two or more*** triangles from the given information. Include a picture and a brief statement supporting your conclusion. (5 pts ea)

A) $A = 130°$, $a = 40$, $c = 60$

B) $A = 40°$, $a = 10$, $c = 10$

C) $A = 50°$, $a = 6$, $c = 10$

D) $A = 30°$, $a = 25$, $c = 30$

E) $C = 30°$, $c = 5$, $b = 4$

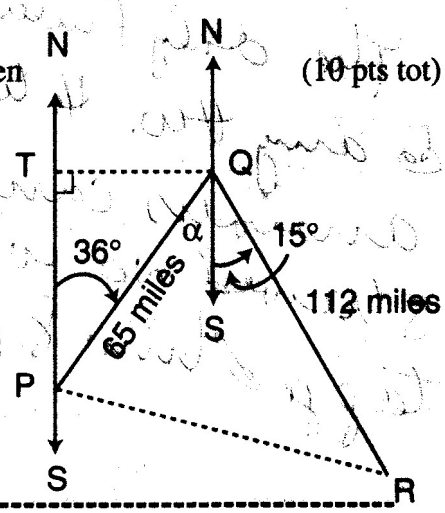
F) $B = 95°42'$, $c = 8$, $A = 84°18'$

**III** A ship leaves port,P, and travels 65 miles on a bearing of N36°E. It then changes course and sails 112 miles on a bearing of S15°E. (10 pts tot)

A) What is angle $\alpha$ ?

B) What is the measure of angle PQR?

C) How far is the ship from port at this point? (ie. find the length PR )




**Extra Credit** ---------- **5 pts** ----------

Solve for $\theta$ where $0 \le \theta < 360°$ $\quad \cot\theta = \tan(2\theta - 270°)$

# Honors Trigonometry

Name Trig Ch 5

Per _____ Date 2002

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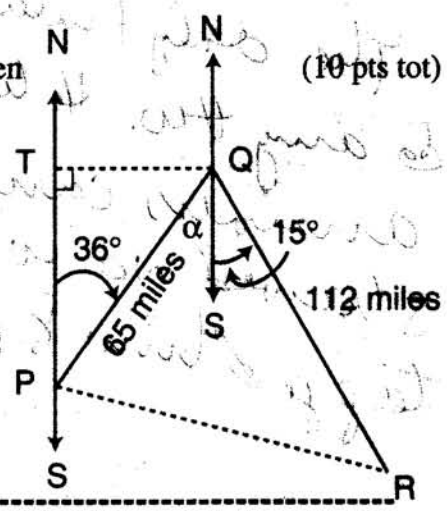



**Extra Credit** ---------- **5 pts** ----------

Solve for $\theta$ where $0 \le \theta < 360°$ $\quad \cot\theta = \tan(2\theta - 270°)$

# Honors Trigonometry Chapter 5

*Finally, we get to really use those calculators!*

**Exam Chapter 4**
Read instructions on back of sked
then do #1 Pg 157-158
1 - 8, 17-24, 33 - 38 11/22

#2 Pg 168 1 – 9, 12
# 3
Pg 168 23 – 26
Pg 180 1 – 3, 6, 7
11/25

# 4 Pg 172 1 - 19 odd
ignore hint on 17;
Simplify, instead.
Find 3rd angle using
Law of Cos to confirm
your work.
11/ 26

## Thanksgiving Vacation

Note:
On Triangle problems we *always* solve for ***all* missing parts.**
On word problems we answer using *complete and meaningful* sentences.

# 5
Pg 172 2 - 20 even
12 / 2

# 6
Sines, Signs, Sigh-n-s
part I
12 / 3

# 7
Sines, Signs, Sigh-n-s
part II
12 / 4

# 8
Sines, Signs, Sigh-n-s
part III
12 / 5

# 9 Pg 179
1 - 6, 8 - 10
Pg 180 9, 10, 11
**IMPORTANT LECTURE**
12 / 6

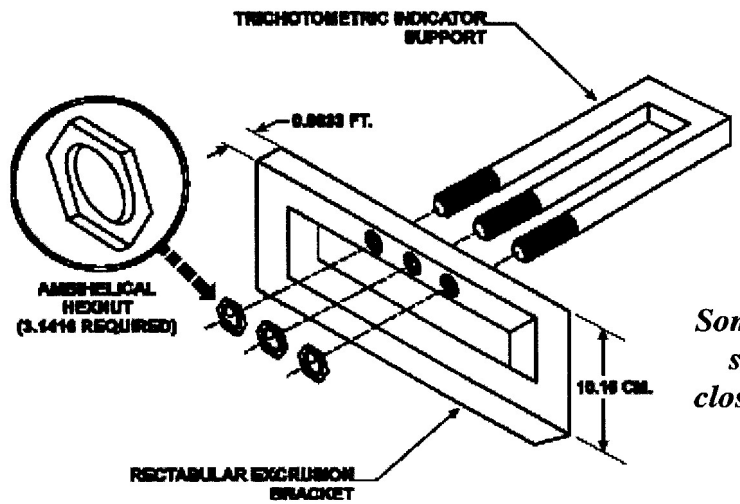
# 10, 11, 12
Begin: "Which is Which?"
**Important Lecture**
12/ 9

Continue on
**"Which is Which"**
12/ 10

Continue on
**"Which is Which"**
**(Due tomorrow)**

# 13 , 14
***"The Right Way"***

"Right Way" Due Today




**Review**
**Put Last Year's Exam On The Chalkboards.**
***Come to Class Prepared!***
12/16

# EXAM
# CHAPTER 5
# 2002
12/17

***Some things are easier than they seem, but you've got to look closely to know Which is Which!***

# Sines Signs Sigh-n-s

**I** Solve for all missing parts. Use Mollweide's formula #1 to verify your work. $\dfrac{a-b}{c} = \dfrac{\sin\frac{1}{2}(A-B)}{\cos\frac{1}{2}C}$

(It's time to break-in that calculator.)

| | | | |
|---|---|---|---|
| 1) | B = 60° | C = 45° | a = 12 |
| 2) | A = 60° | B = 75° | c = $10\sqrt{3}$ |
| 3) | A = 135 | B = 30° | c = 12 |
| 4) | B = 62° | C = 48° | a = 18.2 |

**II** Solve for all missing parts. Use Mollweide's formula # 2 to verify your work. $\dfrac{a+b}{c} = \dfrac{\cos\frac{1}{2}(A-B)}{\sin\frac{1}{2}C}$

| | | | |
|---|---|---|---|
| 1) | A = 54° | B = 38° | c = 5 |
| 2) | A = 20°13 ' | B = 81° 26 ' | a = 318 |
| 3) | A = 48° 59 ' | B = 76° 03 ' | a = 1002 |
| 4) | B = 79° 15 ' | C = 55° 11 ' | a = 1125 |

**III** A couple of *interesting* problems:

a) Three circles with radii of 3, 4, and 5 respectively, touch each other externally. Find the angles of the triangle formed by joining the centers of the three circles.

b) There are two ladders. One ladder is twelve feet long and the other ladder is ten feet long. There are two buildings which are six feet apart. The base of the longer ladder is at the base of building *A* and leans on building *B*. The base of the shorter ladder is at the base of building *B* and leans on building *A*. The ladders cross, of course. The question is, how high (round your answer to the nearest hundredth of a foot) up from the ground is the crossing point?

# SOH-CAH-TOA and the Graphing Calculator

Mr. Mumaugh

1) Put your calculator in DEGREE MODE.

On a TI-82 Press MODE (row 2 column 2) Press the down-arrow 3 times, the right arrow once and press ENTER. Press 2nd QUIT to return to the MAIN SCREEN.

On a Sharp calculator press 2nd then press DRG. This cycles through Degrees, Radians, Grads. Repeat the process until you see the D in the top of the display window.

2) Example: Find $\sin 15^\circ 23' = .2653$

On some machines you will have to use the following sequence to get the $15^\circ 23'$

$(23 \div 60) + 15 = 15.383333...$ and then press the sin key.

On some machines you key 15 press the DMS key then press 23 (if your were putting in "seconds" you would press DMS again) and then press sin.

On a TI-82 press sin then press 15 then press 2nd then ANGLE (row 4 column 2) then press 2. (This looks like the "minute" indicator but on a TI it means the whole sequence of degree-minute-second.) Next press 23 then press 2nd then ANGLE (row 4 column 2) then press 2. Finally press ENTER.

3) Example: Find $\sec 61^\circ 20' = 2.085$

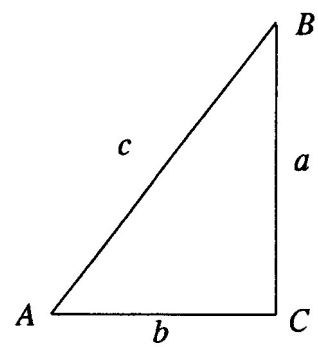
We use the definitions of the co-functions for this type of problem. Key in: $1 / (\cos 61^\circ 20')$

4) Find $\theta$ when $0 < \theta < 90^\circ$ $\tan\theta = 1.379$ $\tan^{-1}(1.379) = 54.0518$

On a TI-82 press 2nd then $\tan^{-1}$ then 1.379 then press ENTER. We want angles in nearest minute so press 2nd ANGLE then ENTER. You will get $54^\circ 3' 6.339''$. Your final answer would be $54^\circ 3'$. Some people like to write $54^\circ 03'$. Either is fine. Remember that you need more than 30 seconds to increase the minute.

## Soh Cah Toa

$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}} \qquad \cos A = \frac{\text{adjacent}}{\text{hypotenuse}} \qquad \tan A = \frac{\text{opposite}}{\text{adjacent}}$$




5) Example: Given terminal side of an angle $(-3, -4)$.

Find $\sin\theta$, $\cos\theta$, $\tan\theta$, and $\theta$.

I suggest considering the triangle as having legs 3 and 4. We know that $\sqrt{3^2 + 4^2} = 5 =$ hypotenuse. Let $\theta = 180 + \alpha$ so

$\tan\alpha = \frac{\text{opp}}{\text{adj}} = \frac{4}{3}$; $\tan^{-1}\left(\frac{4}{3}\right) = 53^\circ 8'$. This method requires that ***you know where the angle actually is.***

$$\cos A = \frac{b}{c} \qquad \cos B = \frac{a}{c}$$
$$\sin A = \frac{a}{c} \qquad \sin B = \frac{b}{c}$$
$$\tan A = \frac{a}{b} \qquad \tan B = \frac{b}{a}$$

So $180^\circ + 53^\circ 8' = \theta$ You will use $53^\circ 8'$ to compute the sine and cosine.

$233^\circ 8' = \theta$ You know that since we "are in the 3rd quadrant", both sine and cosine will be negative.

# Trigonometry -- the *right* way

Mr. Mumaugh
Honors Trig C 5

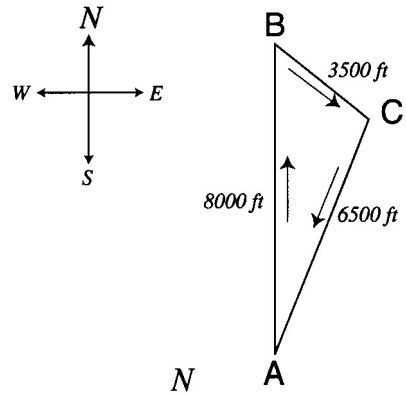
## I

Starting with the "Given", derive the "Find". As usual, do the job with style!

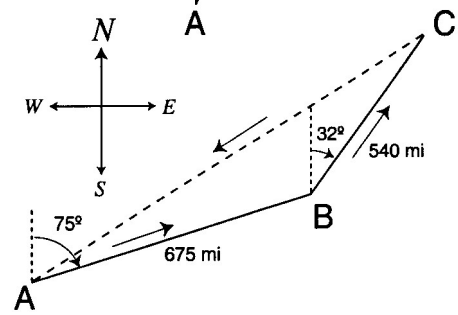
| | Given ..... Find | | Given ..... Find |
|---|---|---|---|
| a) | $\sin\theta = \frac{x}{3}$ ..... $\cos 2\theta$ | g) | $\sec\theta = \frac{x}{3}$ ..... $\tan\theta$ |
| b) | $\tan\theta = \frac{2}{x}$ ..... $\sin 2\theta$ | h) | $\cot\theta = \sqrt{1-x^2}$ ..... $\sin\theta$ |
| c) | $\cos\theta = \frac{x}{3}$ ..... $\tan\theta$ | i) | $\sin\theta = \sqrt{1-x^2}$ ..... $\cot\theta$ |
| d) | $\tan\theta = \frac{x+5}{x}$ ..... $\cos\theta$ | j) | $\tan\theta = \frac{x}{\sqrt{1+x^2}}$ ..... $\csc\theta$ |
| e) | $\csc\theta = \frac{x+2}{x}$ ..... $\tan\theta$ | k) | $\sec\theta = \frac{3}{x}$ ..... $\tan^2\theta$ |
| f) | $\cos\theta = \frac{x}{24}$ ..... $\sin 2\theta$ | l) | $\sin\theta = \frac{x}{4}$ ..... $\tan 2\theta$ |

## II

Navigate your weigh through these fun problems:....




a) A boat race occurs along a triangular course marked by bouys *A*, *B*, and *C*. The race starts with the boats going 8000 feet in a northerly direction. The other two sides of the course lie to the east of the first side, and their lengths are 3500 feet and 6500 feet, as shown in the figure. Find the bearings for the last two legs of the race.
($S\ 52°37'\ E$, and $S\ 25°20'\ W$)




b) A plane flies 675 miles from *A* to *B* with a bearing of $N\ 75°\ E$. Then it flies 540 miles from *B* to *C* with a bearing of $N\ 32°\ E$. Find the straight line distance and bearing for the flight from *C* to *A*.

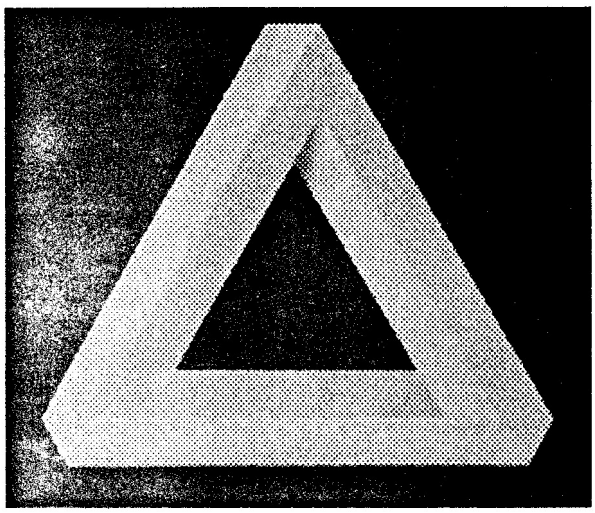
c) Two ships leave a port at 9 a.m. One travels at a bearing of $N\ 53°\ W$ at 12 miles per hour, and the other at a bearing of $S\ 67°\ W$ at 16 miles per hour. Approximate how far apart they at noon of that day.

d) A triangular parcel of land has 375 feet of frontage and the two other boundries have lengths of 250 feet and 300 feet. What angles are formed by the frontage and the two other boundries. How many square feet are enclosed by the triangle?

# Which is Which and Which are You?

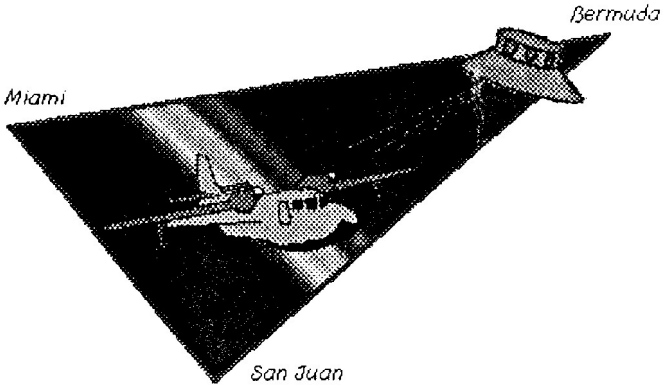
Mr. Mumaugh

*Some triangles beg to be solved.*
*Some triangles are not meant to be solved.*
*Some triangles dare you to solve them.*
*Some triangles do not need to be solved.*
*Some triangles are not really triangles.*
*Some triangles contain hidden secrets.*
*Some people spend their entire life never knowing which is which.*
*Some people know exactly what to do!*



Tell everything there is to know about each of the following "triangles". You need to include a picture, the angle measures, side measures, area and perimeter. Decimals must be accurate to the hundredths so do not round off early. Angles must be accurate to the nearest minute.

| | | | |
|---|---|---|---|
| 1) | $b = 6$ | $c = 4$ | $A = 85^\circ 13'$ |
| 2) | $a = 18.2$ | $B = 62^\circ$ | $C = 48^\circ$ |
| 3) | $A = 30^\circ$ | $b = 20$ | $a = 10$ |
| 4) | $C = 35^\circ 13'$ | $b = 38.15$ | $c = 24.71$ |
| 5) | $a = 5$ | $b = 6$ | $c = 4$ |
| 6) | $c = 5$ | $A = 54^\circ$ | $B = 38^\circ$ |
| 7) | $B = 30^\circ$ | $b = 15$ | $a = 20$ |
| 8) | $C = 48^\circ$ | $b = 25$ | $c = 40$ |
| 9) | $B = 60^\circ$ | $a = 5$ | $c = 8$ |
| 10) | $b = 109$ | $c = 141$ | $C = 40^\circ 16'$ |
| 11) | $A = 118^\circ$ | $a = 70$ | $c = 82$ |
| 12) | $B = 45^\circ$ | $c = 18$ | $b = 9\sqrt{2}$ |
| 13) | $B = 20^\circ$ | $c = 8$ | $b = 5$ |
| 14) | $C = 37^\circ$ | $c = 81.4$ | $a = 99.6$ |
| 15) | $C = 60^\circ$ | $c = 22.5$ | $b = 30$ |
| 16) | $a = 4$ | $b = 7$ | $c = 5$ |




| | | | |
|---|---|---|---|
| 17) | $A = 20^\circ 13$ | $C = 81^\circ 26'$ | $b = 318$ |
| 18) | $b = 83.7$ | $B = 53^\circ 10'$ | $A = 87^\circ 40'$ |
| 19) | $a = 3$ | $b = 7$ | $c = 5$ |
| 20) | $B = 66^\circ$ | $b = 71.3$ | $c = 71.3$ |
| 21) | $A = 30^\circ$ | $c = 717$ | $a = 356$ |
| 22) | $C = 30^\circ 28'$ | $A = 92^\circ 13'$ | $c = .0172$ |
| 23) | $b = \sqrt{3}$ | $c = 2$ | $A = 30$ |
| 24) | $a = 3$ | $b = 5$ | $c = 6$ |
| 25) | $A = 63^\circ$ | $C = 49^\circ$ | $c = 3$ |
| 26) | $A = 163^\circ$ | $a = 97$ | $b = 43$ |
| 27) | $A = 54^\circ$ | $c = 6$ | $a = 8$ |
| 28) | $A = 24^\circ$ | $c = 8$ | $a = 6$ |
| 29) | $a = 6.15$ | $c = 4.25$ | $C = 25^\circ 27'$ |
| 30) | $a = \sqrt{2}$ | $b = \sqrt{6}$ | $C = 150^\circ$ |
| 31) | $B = 34^\circ 12'$ | $C = 73^\circ 15'$ | $b = 3.75$ |
| 32) | $A = 48^\circ 59'$ | $C = 76^\circ 03'$ | $b = 1002$ |
| 33) | $b = \sqrt{2}$ | $c = 3$ | $a = \sqrt{17}$ |
| 34) | $A = 79^\circ 15$ | $B = 55^\circ 11'$ | $c = 1125$ |
| 35) | $b = 37$ | $a = 21$ | $c = 14$ |
| 36) | $c = 8.32$ | $a = 5.18$ | $C = 31^\circ 52'$ |
| 37) | $C = 47^\circ 38'$ | $A = 83^\circ 22'$ | $B = 50^\circ$ |
| 38) | $A = 30^\circ$ | $a = 2.45$ | $c = 4.9$ |
| 39) | $B = 67^\circ$ | $c = 2.5$ | $b = 3$ |
| 40) | $C = 24^\circ$ | $b = 3$ | $c = 2.5$ |

I 5 pts ea.

A) $C = 130^\circ$

$c = 40$

$b = 60$

No $\Delta$ $C < B$

B) $B = 40$

$b = 10$

$c = 10$

1 $\Delta$ $b \sin\theta \approx 6.4$

1 SOS. $\Delta$.

C) $A = 50$

$a = 6$

$b = 10$

$b \sin A = 10 \cdot .7660 = 7.6$

No $\Delta$

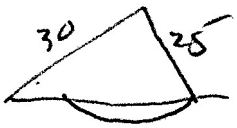
D) $C = 30^\circ$

$c = 25$

$b = 30$

$b \sin 3 = 30 \cdot \frac{1}{2} = 15$

2 $\Delta$s




E) $C = 30^\circ$

$c = 5$

$b = 4$

$b \sin C = 4 \cdot \frac{1}{2} = 2$

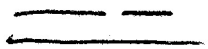
1 $\Delta$

f) $a = 5$

$b = 2$

$c = 8$

No $\Delta$ sum of 2 sides must be > 3rd.



G) $A = 78^\circ$

$B = 60^\circ$ Sum of $\angle$s $> 180^\circ$

$C = 90^\circ$

No $\Delta$

H) $C = 60$

$a = 8$

$B = 60^\circ$

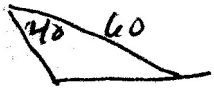
1 Equilat $\Delta$.

I $A = 150$

$a = 60$

$c = 40$

1 $\Delta$.

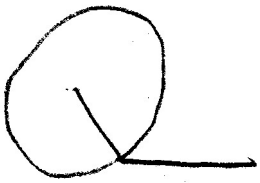



J) $B = 95^\circ$

$a = 22\sqrt{3}$

$b = 22\sqrt{3}$

No $\Delta$ $b \leq a$

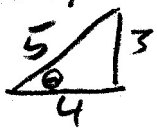


II 5 pts ea

A) $\cos^2(38) + \sin^2(38) = 1$

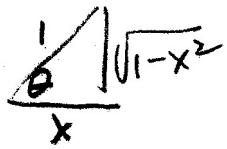
B) $\tan\theta = \frac{3}{4}$

$\csc\theta = \frac{5}{3}$

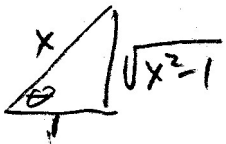



D) $\sec\theta = \frac{1}{x}$

$\sin\theta = \sqrt{1-x^2}$




C) $\sec\theta = x$




$\sin 2\theta = 2\cos\theta\sin\theta = 2\frac{\sqrt{x^2-1}}{x} \cdot \frac{1}{x}$

$\frac{2\sqrt{x^2-1}}{x}$

III

A) $\cot^2\theta - \cos^2\theta = \cot^2\theta\cos^2\theta$

$\frac{\cos^2\theta}{\sin^2\theta} - \cos^2\theta = \frac{\cos^4\theta}{\sin^2\theta}$

$\cos^2\theta\left(\frac{1-\sin^2\theta}{\sin^2\theta}\right) =$

$\frac{\cos^4\theta}{\sin^2\theta} = \frac{\cos^4\theta}{\sin^2\theta}$

Identity $\therefore$ true $\forall\theta$ except $0^\circ, 180^\circ$ (where $\sin = 0$.) 10 pts.

i.e.

$\theta \in (0, 360), \theta \neq 180$

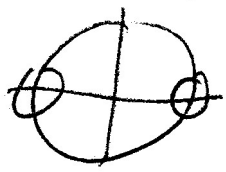
III B $\cos 2\theta = 1 - \sin^2\theta$

10 pts

$\cos^2\theta - \sin^2\theta = 1 - \sin^2\theta$

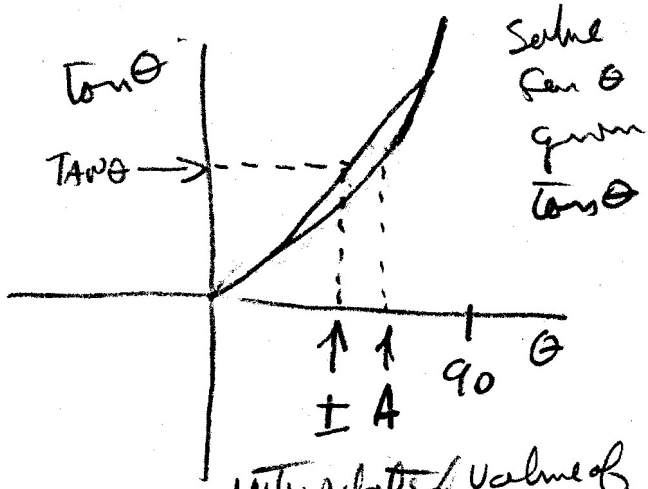
$\cos^2\theta = 1$

$\cos\theta = \pm 1$

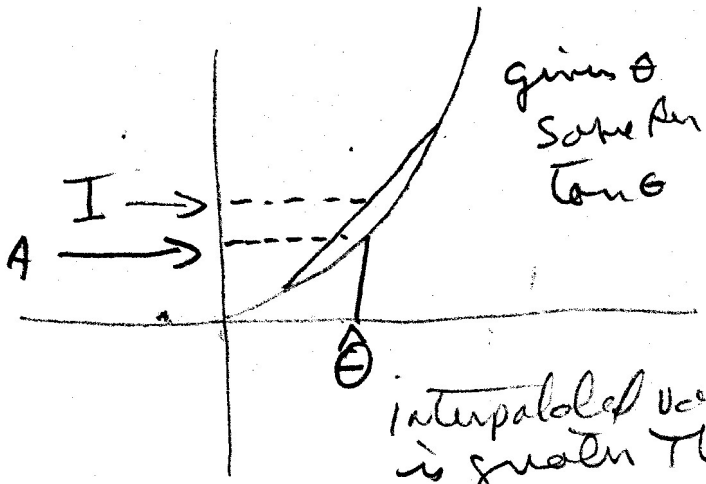


$\theta \in \{0, 180\}$

Extra

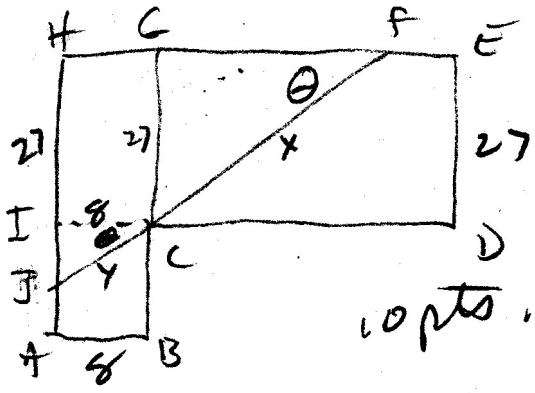



interpolated value of θ is less than actual value




interpolated value is greater than actual value.

IV




10 pts.

$\sin\theta = \frac{27}{x} \therefore x = 27\csc\theta$

$\cos\theta = \frac{8}{Y} \therefore Y = 8\sec\theta$

Since $L = x + Y$

$\overline{JCE} = 27\csc\theta + 8\sec\theta$

another acceptable answer is

$$L = \frac{27 + 8\tan\theta}{\sin\theta}$$

Sin $5^\circ$ = .0872 = Cos $85^\circ$

Sin $14^\circ$ = .2419 = Cos $76^\circ$

Sin $30^\circ$ = .5000 = Cos $60^\circ$

Sin $38^\circ$ = .6157 = Cos $52^\circ$

Sin $40^\circ$ = .6428 = Cos $50^\circ$

Sin $50^\circ$ = .7662 = Cos $40^\circ$

Sin $52^\circ$ = .7880 = Cos $38^\circ$

Sin $60^\circ$ = .8660 = Cos $30^\circ$

Sin $76^\circ$ = .9703 = Cos $14^\circ$

Sin $85^\circ$ = .9961 = Cos $5^\circ$

84

| | 5 | 6 | T |
|---|---|---|---|
| 100↑ | 2 | 1 | 3 |
| 90↑ | 6 | 6 | 12 |
| 80↑ | 14 | 12 | 26 |
| 70↑ | 5 | 3 | 8 |
| 60↑ | 2 | 0 | 2 |
| 59↓ | 3 | 0 | 3 |
| | 82.8 | 86.0 | 82.9 |

I took 5 pts on IV as any attempt was made and gave a full ten if correct — no other partial credit.

Generally I took 5 on II A if final answer was not 1.

I might change the 11 marks in Part IV with emphasized tiny so they are straighter.

No other changes.

TRIGONOMETRY CHAPTER 5 NAME Ch 5 1984

PER Dec 20 1984

======>THERE IS A PARTIAL LIST OF SIN AND COS VALUES ON THE REVERSE SIDE OF THIS PAPER.

1986 also

I State whether there are none, one, or two or more triangles possible from the given information. DO NOT actually solve for ANY missing parts. You are to include a picture and a statement supporting your conclusion. (5 points each) 91

A) $C = 130^\circ$, $c = 40$, $b = 60$

B) $B = 40^\circ$, $b = 10$, $c = 10$

C) $A = 50^\circ$, $a = 6$, $b = 10$

D) $C = 30^\circ$, $c = 25$, $b = 30$

E) $C = 30^\circ$, $c = 5$, $b = 4$

F) $a = 5$, $b = 2$, $c = 8$

G) $A = 38^\circ$, $B = 60^\circ$, $C = 90^\circ$

H) $C = 60^\circ$, $a = 8$, $B = 60^\circ$

I) $A = 150^\circ$, $a = 60$, $c = 40$

J) $B = 95^\circ$, $a = 22\sqrt{3}$, $b = 22\sqrt{3}$

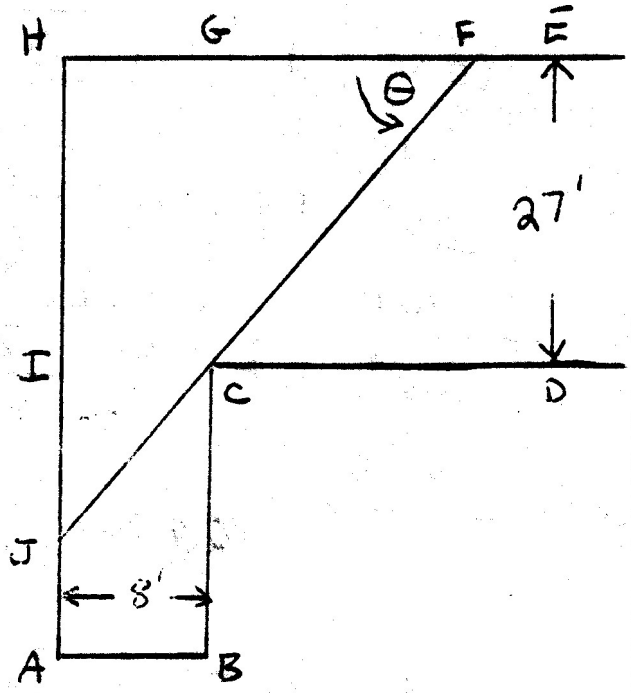
II (5 points each)

A) Given: $\theta = 38^\circ$, determine: $\cos^2 2\theta + \sin^2 2\theta$.

B) Given: $\tan\theta = 3/4$ determine: $\csc\theta$.

C) Given: $\sec\theta = X$ determine: $\sin 2\theta$ in terms of X.

D) Given: $\sec\theta = 1/X$ determine: $\sin\theta$ in terms of X.




III Solve for $\forall\theta$ such that $0^\circ \leq \theta < 360^\circ$ (10 points each)

A) $\cot^2\theta - \cos^2\theta = \cot^2\theta\cos^2\theta$

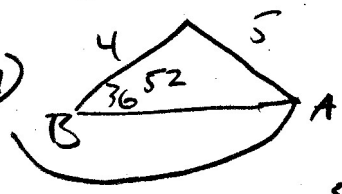
B) $\cos 2\theta = 1 - \sin^2\theta$

IV Consider the given figure. Given: AB//CD//HE, AH//BC//ED, AH ⊥ HE, AB = 8, ED = 27, JCF is a straight line. Determine the length of JF in terms of θ. (10 pts)

EEXXTTRRAACCRREEDDIITT 5 pts

Explain the reason "linear interpolation" is called linear interpolation.

I A) $b=5$

① 


$\frac{\sin A}{a} = \frac{\sin 36^{52}}{b}$

$\frac{\sin A}{4} = \frac{.6}{5}$

$\sin A = .48$

$A = 28^\circ 12'$

$\triangle A = 28^\circ 41'$

2) $b=4$

$A = 36^\circ 52'$

Iso scales $\triangle$.

$\frac{\sin A}{4} = \frac{\sin 36^{52}}{3}$

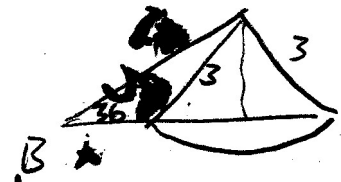
$\sin A = \frac{.6}{3}(4)$

$= .8000$

$A = 53^\circ 8'$

$53^\circ 8'$

③ $2\triangle s$ $b=3$



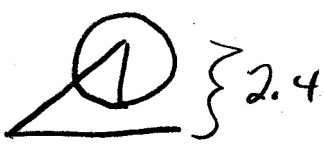

$4 \sin 36^{52}$

$4(.6) = 2.4 < 3$

$\therefore 2\triangle s.$

$$\begin{array}{r} 179\ 60 \\ 53\ \ 8 \\ \hline 126^\circ 52' = A' \end{array}$$

4) $b=2$




$2.4 > 2 \therefore$ NO $\triangle$.

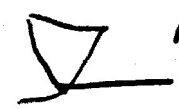
B)

① NO $\triangle$ when $b < 2.4$

② 2 $\triangle$s when $2.4 < b < 4$

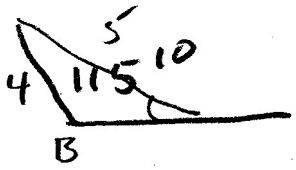
③ 1 $\triangle$ when $b = 2.4$ or $b \geq 4$

$$\begin{array}{r} 179\ 60 \\ 115\ 10 \\ \hline 64\ 50 \end{array}$$

② $b=4$  NO $\triangle$s

③ $b=3$ NO $\triangle$s

④ $b=2$ NO $\triangle$s

II 


① $b=5$

$\sin 115^{10} =$

$\sin 64^{50} = .9050$

$\frac{\sin B}{5} = \frac{\sin A}{4}$

$\frac{4(.9050)}{5}$

$4(.181)$

$.7240 = \sin A$

$A = 46^\circ 23$

II B) ① NO $\triangle$ when $b \leq 4$

② Never $2\triangle s$

③ $1\triangle s$ when $b > 4$

III

A) $\sec^2 2\theta + \tan 2\theta = 1$

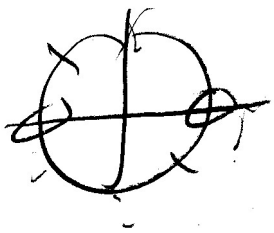
$s^2 + c^2 = 1$

$t^2 + 1 = \sec^2$

$\tan^2 2\theta + 1 + \tan 2\theta = 1$

$\tan^2 2\theta + \tan 2\theta = 0$

$\tan 2\theta(\tan 2\theta + 1)$



$2\theta \{0, 135, 180, 315\}$

$\theta \{0, \frac{135}{2}, 90, \frac{315}{2}\}$

B) $\csc\theta - \cos\theta \cot\theta = \sin\theta$

$\frac{1}{\sin\theta} - \frac{\cos^2\theta}{\sin\theta} =$

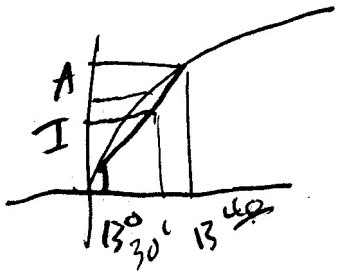
$\frac{1-\cos^2\theta}{\sin\theta}$

$\frac{\sin^2\theta}{\sin\theta}$

$\sin\theta = \sin\theta$

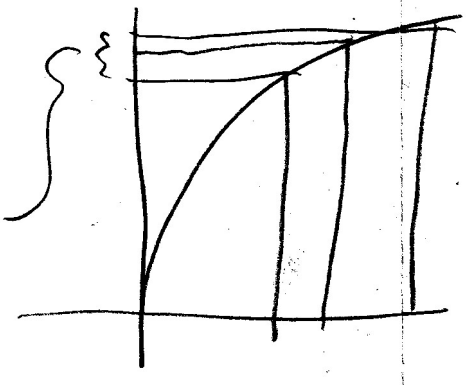
$\theta \{0, 180\}$

IV A) Explain interpolation




B) Yes

Less area



Joella Gobell 98
PJ Kappel 88
Andy D'Acquisto 87
Pat Wibbeler 85
Kevin Davison 49

Honors Trigonometry
Copy original problem.
Convince *me* that **you** understand the concept!

Name Trig ch 5 MU

Per _____ Date 12/18/91

# Chapter 5 Make-Up Exam

**I** Triangle ABC is to be constructed from the measures of two sides and a non-included angle. Given: angle B = 36°52' and side a = 4. (draw the proper picture for each part, of course.) (tot 35 pts)

A) Find all possible measures of angle A when:

1) b = 5 2) b = 4 3) b = 3 4) b = 2

B) Angle B remains 36°52' and side a continues to be 4.

Find the specific range of values for side b for which there will be:
(b is assumed to be positive. Your answer will be similar to: $5 < b \leq 7$. Describe to interval which allows the following to exist. If there is no interval which meets the conditions, then state that fact.)

1) no triangle 2) exactly 2 triangles 3) exactly 1 triangle

**II** This is similar to secton I. In secton II, angle B = 115°10' and side a = 4. (draw the proper picture for each part, of course.) (tot 25 pts)

A) Find all possible measures of angle A when:

1) b = 5 2) b = 4 3) b = 3 4) b = 2

B) Angle B remains 115°10' and side a continues to be 4.

Find the specific range of values for side b for which there will be:
(b is assumed to be positive. Your answer will be similar to: $5 < b \leq 7$. Describe to interval which allows the following to exist. If there is no interval which meets the conditions, then state that fact.)

1) no triangle 2) exactly 2 triangles 3) exactly 1 triangle

**III** Solve for $\theta$ where $0 \leq \theta < 360°$. (10 pts ea)

A) $\sec^2 2\theta + \tan 2\theta = 1$ B) $\csc\theta - \cos\theta\cot\theta = \sin\theta$

**IV** Linear interpolation (total 20 pts)

A) Explain what interpolation is. Use sin 13°37' in your explanation.

B) Would your approximation for sin 83°37' be more accurate? Explain.

I

A) a 2
b $2\sqrt{3}$
c 4
✓ A 30
✓ B 60
✓ C 90

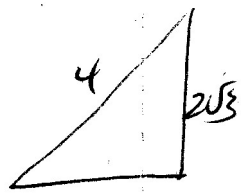
$a^2 = b^2 + c^2 - 2bc\cos A$

$4 = 12 + 16 - 16\sqrt{3}\cos A$

$\frac{-24}{-16\sqrt{3}} = \cos A$

$.8660 = \cos A$

$A = 30$




$b^2 = a^2 + c^2 - 2ac\cos B$

$12 = 4 + 16 - 16\cos B$

$\frac{-8}{-16} = \cos B$

$.5 = \cos B$

$B = 60^\circ$

$c^2 = a^2 + b^2 - 2ab\cos C$

$16 = 4 + 12 - 8\sqrt{3}\cos A$

$0 = -8\cos A$

$A = 90^\circ$

✓ Area $= \frac{1}{2} \cdot 2 \cdot 2\sqrt{3} = 2\sqrt{3} = 3.5$

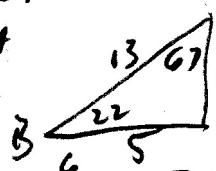
B) a = 5
b = 12
c = 13
✓ A = $22^{37}$
✓ B = $67^{23}$
✓ C = 90

$a^2 = b^2 + c^2 - 2bc\cos A$

$25 = 144 + 169 - 312\cos A$

$\frac{-288}{-312} = \cos A$

$.9231 = \cos A$




Area $= \frac{1}{2} \cdot 5 \cdot 12 = 30$ ✓

$b^2 = a^2 + c^2 - 2ac\cos B$

$144 = 25 + 169 - 130\cos B$

$\frac{-50}{-130} = \cos B$

$B = 67^\circ 23$

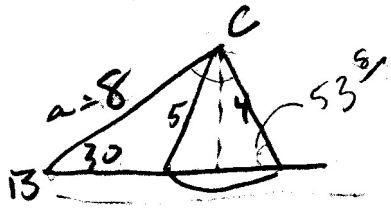
$c^2 = a^2 + b^2 - 2ab\cos A$

$169 = 25 + 144 -$

$0 = -120\cos A$

$A = 90^\circ$

C) a = 8
b = 5
✓ c = 9.9
✓ c' = 3.9
✓ A = $53^{8}$
✓ A' = $126^{52}$
B = 30
✓ C = $96^{52}$
✓ C' = $23^{08}$




$\frac{\sin A}{a} = \frac{\sin B}{b}$

$= \frac{\sin 30}{5} = \frac{1}{10}$

$\sin A = \frac{8}{10}$

$A = 53^{08} \rightarrow A = 126^{52}$ ✓

$\therefore C = 96^{52}$ $\quad C = 23^{08}$

Area = 19.8

Area' = 7.8

2 Δs −7

$\frac{c}{\sin 96^{52}} = 10$

$c = 10($

$c = 9.928$

$\frac{c'}{\sin 23^{8}} = 10$

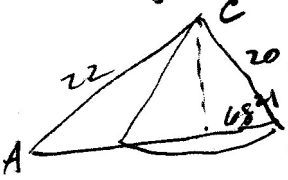
$c' = 3.929$

$\frac{1}{2} \cdot 9.9 \cdot 4$

$\frac{1}{2} \cdot 3.9 \cdot 4$

2 Δs
−7

D) a = 20
b = 22
✓ c = 19.1
✓ c' = 4.4
A = $57^{\circ}40$
✓ B = $68^{21}$
✓ B' = 111
✓ C = $53^{59}$
✓ C' = $10^{41}$




$22\sin 57^{40} =$

$22(.84495) =$

18.6

$.04224 = \frac{\sin 57^{40}}{20} = \frac{\sin B}{22}$ 2 Δs.

$\sin B = .9294$

$B = 68^{21}$

$B' = 111^{39}$

$C' = 10^{41}$

$\frac{20}{\sin 57^{40}} = \frac{c}{\sin 53^{59}} = \frac{c'}{\sin 10^{41}}$

$23.67 = \frac{\quad}{.8088}$

$c = 19.145$

$c' = 4.38796$

Area $= \frac{1}{2}\, 19.1 \cdot (18.6) = 177.63$

Area' $= \frac{1}{2}(4.4)(18.6) = 40.92$

II

a) $\tan^{-1}(1+\theta)+\tan^{-1}(1-\theta)=90^\circ$ $\quad$ $\tan 90 = -5$

$\cos(\qquad\qquad\qquad\qquad) = \cos 90^\circ$ $\quad$ improper add formula $-5$

$\cos(\tan^{-1}(1+\theta))\cos\tan^{-1}(1-\theta) - \sin(\tan^{-1}(1+\theta)\sin(\tan^{-1}(1-\theta) = 0$

$$\frac{1}{\sqrt{1+(1+\theta)^2}}\cdot\frac{1}{\sqrt{1+(1-\theta)^2}} - \frac{1+\theta}{\sqrt{1+(1+\theta)^2}}\cdot\frac{1-\theta}{\sqrt{1+(1-\theta)^2}} = 0$$

$$1 - (1-\theta^2) = 0$$

$$\theta = 0$$

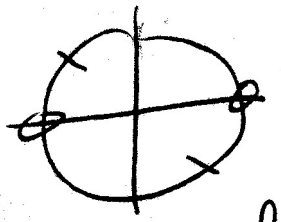
b) $\sec^2 2\theta + \tan 2\theta = 1$

$s^2+c^2=1$

$t^2+1=\sec^2\theta$

$\tan^2 2\theta + 1 + \tan 2\theta = 1$

$\tan 2\theta(\tan 2\theta + 1) = 0$



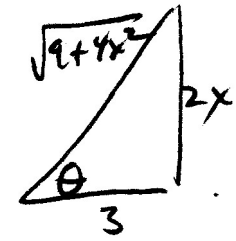
$2\theta \in \{0, 135, 180, 315, 360, 495, 540, 675\}$

$\theta \in \{0, \frac{135}{2}, 90, \frac{315}{2}, 180, \frac{495}{2}, 270, \frac{675}{2}\}$

2x around $-1$

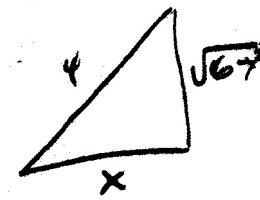
III

a) $\tan\theta = \frac{2x}{3}$




$\csc\theta = \frac{\sqrt{9+4x^2}}{2x}$

b) $\cos\theta = \frac{x}{4}$




$\sin 2\theta$

$2\sin\theta\cos\theta$

$\cancel{2}\,\frac{\sqrt{16-x^2}}{\cancel{4}\,2}\cdot\frac{x}{4}$

$\frac{x\sqrt{16-x^2}}{8}$

Extra

$\sec\theta + \tan\theta = \frac{22}{7}$ $\quad$ let $\sec\theta - \tan\theta = K$

$\sec^2\theta - \tan^2\theta = \frac{22}{7}\cdot K$

$\tan^2\theta + 1 - \tan^2\theta = \frac{22}{7}\cdot K$

$1 = \frac{22}{7}K$

$K = \frac{7}{22}.$

92

Excellent Exam

many ignored ambiguous case possibilities

Need Explain when I hand back exams that roundoff in different locations in a problem can cause radical differences in final answers.

| | 2 | 5 | T |
|---|---|---|---|
| 100 | 0 | 1 | 1 |
| 90 | 1 | 3 | 4 |
| 80 | 6 | 8 | 14 |
| 70 | 8 | 7 | 15 |
| 60 | 4 | 3 | 7 |
| 59 | 3 | 1 | 4 |

101

37

$\frac{1600}{22}$ $\frac{1825}{23}$ $\frac{3425}{45}$

72.7 79.35 76.1

95

They need more
Practice with ambig case
Problems before exam

Make up a ditto with atleast 20
Problems based on the ambig case theo.
some with 1, some with none
as well as some with 2 A's.

then have summary sheet with 20
to include SSS, SAS, ASA <u>as well as</u>
ambig case problems.

| | S | G | T |
|---|---|---|---|
| 100 | 0 | 0 | 0 |
| 90 | 3 | 4 | 7 |
| 80 | 5 | 4 | 9 |
| 70 | 8 | 7 | 15 |
| 60 | 9 | 6 | 15 |
| 59 | 3 | 5 | 8 |

97

28

$\frac{1967}{27}$ $\frac{1846}{25}$ 73.3

72.9 73.84

**Honors Trigonometry** Name Ch 5 Trig

Copy original problem. Per _____ Date _____

Convince *me* that **you** understand the concept! 12/13/85

## Chapter 1 Exam

chapter 5

**I** For each of the following:
(Round final answers for lengths to nearest tenth and degrees to nearest minute.) (15 pts ea)

i) Draw an appropriate picture.

ii) Find all missing parts.

iii) Find the area of the figure.

a) $a = 2$, $b = 2\sqrt{3}$, $c = 4$

b) $a = 5$, $b = 12$, $c = 13$

c) $a = 8$, $b = 5$, $B = 30^\circ$

d) $a = 20$, $b = 22$, $A = 57^\circ 40'$

**II** Solve for $\theta$ where $0 \le \theta < 360^\circ$ (15 pts ea)

a) $\tan^{-1}(1 + \theta) + \tan^{-1}(1 - \theta) = 90^\circ$

b) $\sec^2 2\theta + \tan 2\theta = 1$

**III** Draw a properly labeled picture justifying your conclusion: (5 pts ea)

a) Given $\tan\theta = \frac{2x}{3}$, find $\csc\theta$.

b) Given $\cos\theta = \frac{x}{4}$ find $\sin 2\theta$.

**Extra Credit** ---------- **5 pts** ----------

Given $\sec\theta + \tan\theta = \frac{22}{7}$. Find $\sec\theta - \tan\theta$

I (A) SSS

A $28^{57}$

B $46^{34}$

C $104^{29}$

* a = 10
* b = 15
* c = 20

$100 = 225 + 400 - 600\cos A$

$.875 = \cos A$

$A = 28^{57}$

$225 = 100 + 400 - 400\cos B$

$\frac{-275}{400} = \cos B$

$B = 46^{34}$

$400 = 100 + 225 - 300\cos C$

$\frac{75}{-300} = \cos C$

$C = 104^{29}$

(B) SAS

A = $31^{59}$

B = $118^{1}$

* C = 30°
* a = 12
* b = 20

c = 11.3273

$c^2 = 12^2 + 20^2 - 480\cos 30$

$= 544 - 415.6922$

$= 128.3078$

$c = 11.3273$

$b^2 = a^2 + c^2 - 2ac\cos B$

$400 = 144 + 128.3078 - 24(11.3273)\cos B$

$\frac{127.6922}{-271.8553} = \cos B$

$-.469 = \cos B$

$B = 118$

2AS = −8

$a^2 = b^2 + c^2 - 2bc\cos A$

$144 = 400 + 128.3078 - 40(11.3273)\cos A$

$\frac{384.3078}{453.0921} = \cos A$

$.8477 = \cos A$

$A = 32°2$

C) ASA

* A = 38°
* B = 25
* C = 117
* a =
* b = 15
* c =

$\begin{array}{r} 180 \\ -63 \\ \hline 117 \end{array}$

$\frac{b}{\sin B} = \frac{c}{\sin C} = \frac{a}{\sin A}$

35.4930

c = 31.6245

a = 21.8517

D) SSA

* A = 35
* B = 47.31
* B' = $132^{29}$
* C = $97^{29}$
* C' = $12^{31}$
* a = 7
* b = 9
* c = 12.1002
* c' = 2.6449

$\frac{\sin A}{a} = \frac{\sin B}{b}$

$\frac{9}{7}\sin 35 = \sin B$

$.7375 = \sin B$

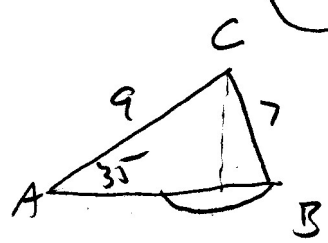
$B = 47^{0}31$

$\begin{array}{r} 179\,60 \\ 47\,31 \\ \hline 132\,29 \end{array}$ B' =

$\begin{array}{r} 179\,60 \\ -82\,31 \\ \hline 97\,29 \end{array}$ C =

$\begin{array}{r} 132\,29 \\ 31 \\ \hline 167\,29 \end{array}$

$\begin{array}{r} 179\,60 \\ -167\,29 \\ \hline 12\,31 \end{array}$ C' =




$9\sin 35 = 5.1622$

$\frac{a}{\sin A} = 12.2041 = \frac{c}{\sin C} = \frac{c'}{\sin C'}$

c = 12.1002

c' = 2.6449

Not 2AS.

−10

I (A) SSS

A $28^{57}$

B $46^{34}$

C $104^{29}$

* a = 10
* b = 15
* c = 20

$100 = 225 + 400 - 600\cos A$

$.875 = \cos A$

$A = 28^{57}$

$.225 = 100 + 400 - 400\cos B$

$\frac{-275}{400} = \cos B$

$B = 46^{34}$

$400 = 100 + 225 - 300\cos C$

$\frac{75}{-300} = \cos C$

$C = 104^{29}$

(B) SAS

A = $31^{59}$

B = 118

* c = 30°
* a = 12
* b = 20

c = 11.3273

$c^2 = 12^2 + 20^2 - 480\cos 30$

$= 544 - 415.6922$

$= 128.3078$

$c = 11.3273$

$b^2 = a^2 + c^2 - 2ac\cos B$

$400 = 144 + 128.3078 - 24(11.3273)\cos B$

$\frac{127.6922}{-271.8553} = \cos B$

$-.4697 = \cos B$

$B = 118$

$a^2 = b^2 + c^2 - 2bc\cos A$

$144 = 400 + 128.3078 - 40(11.3273)\cos A$

$\frac{384.3078}{453.0921} = \cos A$

$.8477 = \cos A$

$A = 32°2$

2ΔS = −8

C) ASA

* A = 38°
* B = 25

C = 117

a =

* b = 15

c =

$\begin{array}{r} 180 \\ -63 \\ \hline 117 \end{array}$

$\frac{b}{\sin B} = \frac{c}{\sin C} = \frac{a}{\sin A}$

35.4930

c = 31.6245

a = 21.8517

D) SSA

* A = 35

B = 47.31

B' = $132^{29}$

C = $97^{29}$

C' = $12^{31}$

* a = 7
* b = 9

c = 12.1002

c' = 2.6449

$\frac{\sin A}{a} = \frac{\sin B}{b}$

$\frac{9}{7}\sin 35 = \sin B$

$.7375 = \sin B$

$B = 47°31$

$\begin{array}{r} 17960 \\ 4731 \\ \hline 13229 \end{array}$

B' = 13229

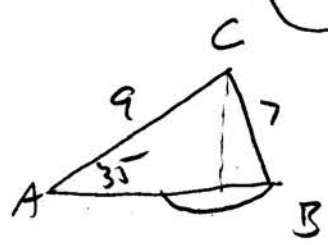
$\begin{array}{r} 17960 \\ -8231 \\ \hline 9729 \end{array}$

C = 9729

$\begin{array}{r} 132.29 \\ 35 \\ \hline -16729 \end{array}$

$\begin{array}{r} 17960 \\ -16729 \\ \hline 1231 \end{array}$

C' = 1231




$9\sin 35 = 5.1622$

$\frac{a}{\sin A} = 12.2041 = \frac{c}{\sin C} = \frac{c'}{\sin C'}$

c = 12.1002

c' = 2.6449

Not 2ΔS.

−10

I E)

$A = 36^{\underline{52}}$

$B = 53^{8}$

$C = 90$

$a = 3$

$b = 4$

$c = 5$

$a^2 = b^2 + c^2 - 2bc\cos A$

$9 = 16 + 25 - 40\cos A$

$\frac{32}{40} = \frac{4}{5} = .8 = \cos A$

$A = 36^{\underline{52}}$

$30 - 60 - 90 = -7$

$b^2 = a^2 + c^2 - 2ac\cos B$

$16 = 9 + 25 - 30\cos B$

$\frac{18}{30} = \frac{3}{10} = \cos B$

$B = 53^{\underline{8}}$

$c^2 = a^2 + b^2 - 2ab\cos C$

$25 = 9 + 16 - 24\cos C$

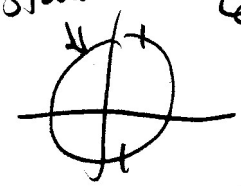
$0 = 24\cos C$

$C = 90^\circ$

II

A) $\cos^2(\theta+60) - \sin^2(\theta+60) > \frac{1}{2}$ 6 PTS

start



$\cos 2(\theta+60) = \frac{1}{2}$

$0 \le \theta < 360$

$60 \le \theta + 60 < 420$

$120 \le 2(\theta+60) < 840$

$2(\theta+60) \in \{300, 420, 660, 780\}$

$\theta + 60 \in \{150, 210, 330, 390\}$

$\theta \in \{90, 150, 270, 330\}$

B) $\sin\theta + \cos\theta = 1$

$\sin\theta = 1 - \cos\theta$

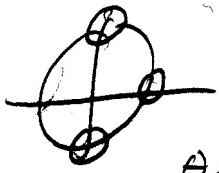
$\sin^2\theta = 1 - 2\cos\theta + \cos^2\theta$

$1 - \cos^2\theta =$

$2\cos^2\theta - 2\cos\theta = 0$

$\cos\theta(\cos\theta - 1) = 0$

LHS $= -8$



$\theta \in \{0, 90, 270\}$

CK = 3 PTS

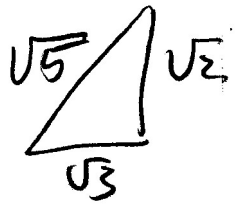
$\theta = 0 \quad 0 + 1 = 1$ ✓

$\theta = 90 \quad 1 + 0 = 1$ ✓

$\theta = 270 \quad -1 + 0 \ne 1$ reject

$\theta \in \{0, 90\}$

III $\tan^2\theta = \frac{2}{3}$




$\csc 2\theta =$

$$\frac{1}{2\sin\theta\cos\theta} = \frac{1}{2\frac{\sqrt{2}}{\sqrt{5}}\cdot\frac{\sqrt{3}}{\sqrt{5}}} = \frac{1}{\frac{2\sqrt{6}}{5}} = \frac{5}{2\sqrt{6}} = \frac{5\sqrt{6}}{12}$$

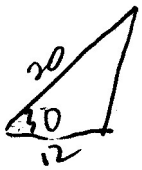
Extra.

A)

$\frac{1}{2}15\cdot 10\sin 104$

Area $= 72.6165$

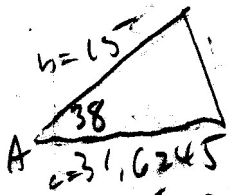
B)




$\frac{1}{2}20\cdot 12\sin 30$

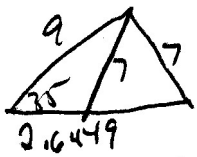
Area $= 60$

C)




Area $= 146.0249$

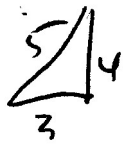
D)




Area $= 51.2318$

Area $= 4.8267$

E)




$\frac{1}{2}\cdot 4\cdot 3 =$

$6$

I E)

$A = 36^{\underline{53}}$

$B = 53^{8}$

$C = 90$

$a = 3$

$b = 4$

$c = 5$

$a^2 = b^2 + c^2 - 2bc\cos A$

$9 = 16 + 25 - 40\cos A$

$\frac{32}{40} = \frac{4}{5} = .8 = \cos A$

$A = 36^{\underline{52}}$

$30 - 60 - 90 = -7$

$b^2 = a^2 + c^2 - 2ac\cos B$

$16 = 9 + 25 - 30\cos B$

$\frac{18}{30} = \frac{3}{10} = \cos B$

$B = 53^{\underline{8}}$

$c^2 = a^2 + b^2 - 2ab\cos C$

$25 = 9 + 16 - 24\cos C$

$0 = 24\cos C$

$C = 90^\circ$

II

A) $\cos^2(\theta+60) - \sin^2(\theta+60) > \frac{1}{2}$ 6 PTS

start

$\cos 2(\theta+60) = \frac{1}{2}$

$0 \le \theta < 360$

$60 \le \theta + 60 < 420$

$120 \le 2(\theta+60) < 840$

$2(\theta+60) \in \{300, 420, 660, 780\}$

$\theta + 60 \in \{150, 210, 330, 390\}$

$\theta \in \{90, 150, 270, 330\}$

B) $\sin\theta + \cos\theta = 1$

$\sin\theta = 1 - \cos\theta$

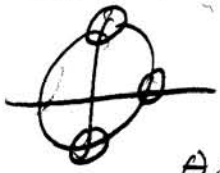
$\sin^2\theta = 1 - 2\cos\theta + \cos^2\theta$

$1 - \cos^2\theta =$

$2\cos^2\theta - 2\cos\theta = 0$

$\cos\theta(\cos\theta - 1) = 0$

LHS $= -8$



$\theta \in \{0, 90, 270\}$

CK = 3 PTS

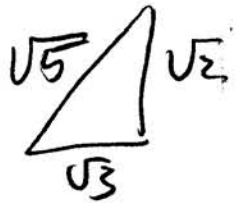
$\theta = 0 \quad 0 + 1 = 1$ ✓

$\theta = 90 \quad 1 + 0 = 1$ ✓

$\theta = 270 \quad -1 + 0 \ne 1$ reject

$\theta \in \{0, 90\}$.

III $\tan^2\theta = \frac{2}{3}$




$\csc 2\theta =$

$$\frac{1}{2\sin\theta\cos\theta} = \frac{1}{2\frac{\sqrt{2}}{\sqrt{5}}\cdot\frac{\sqrt{3}}{\sqrt{5}}} = \frac{1}{\frac{2\sqrt{6}}{5}} = \frac{5}{2\sqrt{6}} = \frac{5\sqrt{6}}{12}$$

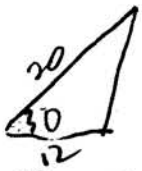
Extra.

A)

$\frac{1}{2}15\cdot 10\sin 104$

Area $= 72.6165$

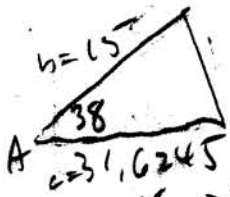
B)




$\frac{1}{2}20\cdot 12\sin 30$

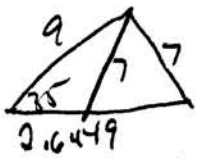
Area $= 60$

C)




Area $= 146.0249$

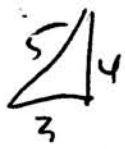
D)




Area $= 51.2318$

Area $= 6.8267$

E)




$\frac{1}{2}\cdot 4\cdot 3 =$

$6$

97

12/11/01

| 100 | 6 |
|---|---|
| 90 | 6 |
| 80 | 10 |
| 70 | 4 |
| 60 | 0 |
| 59 | 1 |

104

55

| | 3 | 5 | T |
|---|---|---|---|
| 100 | 3 | 0 | 3 |
| 90 | 4 | 9 | 13 |
| 80 | 12 | 8 | 20 |
| 70 | 2 | 5 | 7 |
| 60 | 1 | 5 | 6 |
| 59 | 1 | 1 | 2 |

105

53

$\frac{2388}{27}$ 88.4

$\frac{1983}{23}$ 86.2

$\frac{2262}{28}$ 80.8

83.2

change decimal accuracy
to 3 places and emphasize
that through out
the unit.

STILL great team!

Great team!

I

A)

$A\ 28^{57}$

$B\ 46^{34}$

$C = 104^{29}$

✓ $a = 10$

✓ $b = 15$

✓ $c = 20$

Area $= 72.62$

$a^2 = b^2 + c^2 - 2bc\cos A$

$100 = 225 + 400 - 600\cos A$

$.875 = \cos A$

$A = 28^{57}$

$b^2 = a^2 + c^2 - 2ac\cos B$

$225 = 100 + 400 - 400\cos B$

$\frac{-275}{-400} = \cos B$

$B = 46^{34}$

$c^2 = a^2 + b^2 - 2ab\cos C$

$400 = 100 + 225 - 300\cos C$

$\frac{75}{-300} = \cos C$

$-.25 = \cos C$

$C = 104^{29}$

Area $\frac{1}{2}ab\sin C$

$\frac{1}{2}(10)(15)\sin 104^{29}$

$72.62$

B)

$A = 32$

$B = 118$

✓ $C = 30$

✓ $a = 12$

✓ $b = 20$

$c = 11^{33}$

Area 60

$c^2 = a^2 + b^2 - 2ab\cos C$

$c^2 = 12^2 + 20^2 - 480\cos 30$

$= 544 - 415.692$

$c^2 = 128.31$

$c = 11.33$

$b^2 = a^2 + c^2 - 2ac\cos B$

$400 = 144 + 128.31 - 24(11.33)\cos B$

$\frac{127.69}{-271.92} = -.4696 = \cos B$

$B = 118^0$

$a^2 = b^2 + c^2 - 2bc\cos A$

$144 = 400 + 128.31 - 40(11.33)\cos A$

$\frac{-384.31}{-453.2} = \cos A = .8480$

$A = 32^0$

Area $\frac{1}{2}(11.33)(20)\sin 32$

60

C)

✓ $A = 38$

✓ $B = 25$

$C = 117$

$a = 21.85$

$b = 15$

$c = 31.62$

Area $= 146$

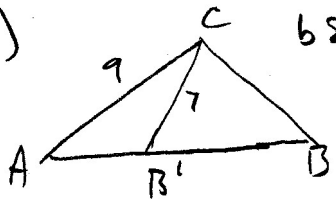
$\frac{15}{\sin 25} = \frac{a}{\sin 38} = \frac{c}{\sin 117}$

$35.49 \quad \frac{}{.6157} \quad \frac{}{.8910}$

$a = 21.85 \quad c = 31.62$

Area $\frac{1}{2}(15)(31.62)\sin 38$

D)




✓ $A = 35$

$B = 47^{31}$

$B' = 132^{29}$

$C = 97^{29}$

$C' = 12^{31}$

✓ $a = 7$

✓ $b = 9$

$c = 12.1$

$c' = 2.64$

Area 31.23 and 6.81

$b\sin A = 4.59$

$\frac{\sin A}{a} = \frac{\sin B}{b}$

$\frac{\sin 35}{7} = \frac{\sin B}{9}$

$.0814 = \frac{\sin B}{7}$

$.7375 = \sin B$

$B = 47^{31}$

$B' = 132^{29}$

$C = 97^{29}$

$C' = 12^{31}$

$\frac{a}{\sin A} = 12.20 = \frac{c}{\sin C} \quad c = 12.1$

$\frac{c'}{\sin c'}$

$c' = 2.64$

Area $\frac{1}{2}9(12.1)\sin 35 = 31.23$

Area $\frac{1}{2}9(2.64)\sin 35 = 6.81$

II E)

$A = 36^{52}$

$B = 53^{8}$

$C = 90^{\circ}$

✓ $a = 3$

✓ $b = 4$

✓ $c = 5$

area $= 6$

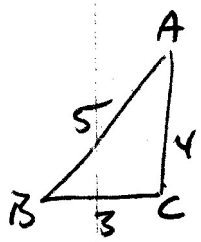
$a^2 = b^2 + c^2 - 2bc \cos A$

$9 = 16 + 25 - 40 \cos A$

$\frac{-32}{-40} = \cos A$

$.8 = \cos A$

$36^{\circ}\underline{52}$




$\frac{1}{2} \cdot 3 \cdot 4 = 6$

$b^2 = a^2 + c^2 - 2ac \cos B$

$16 = 9 + 25 - 30 \cos B$

$\frac{-18}{-30} = \cos B$

$.6 = \cos B$

$53^{\circ}\underline{8}$

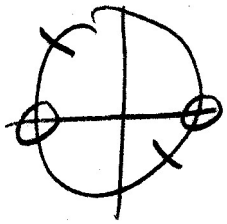
II $\sec^2 2\theta + \tan 2\theta = 1$

$s^2 + c^2 = 1$

$\tan^2 + 1 = \sec^2$

$\tan^2 2\theta + \tan 2\theta = 0$

$\tan 2\theta(\tan 2\theta + 1) = 0$



$2\theta \in \{0, 135, 180, 315, 360, 495, 540, 375\}$

$\theta \in \{0, \frac{135}{2}, 90, \frac{315}{2}, 180, \frac{495}{2}, 270, \frac{375}{2}\}$

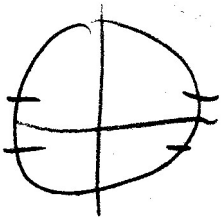
III $\cot\theta \tan 2\theta = 3$

$\cancel{\cot\theta} \frac{2\cancel{\tan\theta}}{1 - \tan^2\theta} = 3$

$2 = 3 - 3\tan^2\theta$

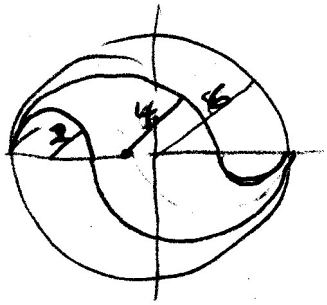
$3\tan^2\theta = 1$

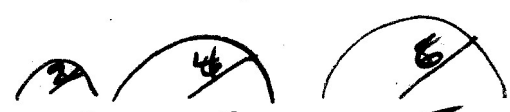
$\tan\theta = \pm \frac{1}{\sqrt{3}} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}$



$\theta \in \{30, 150, 210, 330\}$

Extra




$2\pi \quad 8\pi$

$6\pi$
$+6\pi$
$12\pi$ white area

$18\pi$
$-8$
$10\pi$
$+2\pi$
$12\pi$ Dark areas

∴ white area = either Dark area.

93

| | 2 | 5 | T |
|---|---|---|---|
| 100 | 0 | 0 | 0 |
| 90 | 9 | 6 | 15 |
| 80 | 8 | 7 | 15 |
| 70 | 3 | 6 | 9 |
| 60 | 1 | 3 | 3 |
| 59 | 3 | 2 | 5 |

98

51

$\frac{1970}{24}$ $\frac{1884}{24}$ $\frac{3854}{48}$ (32)

82.1 78.5 80.3

97

| | | | |
|---|---|---|---|
| 100 | 0 | 1 | 1 |
| 90 | 6 | 5 | 11 |
| 80 | 8 | 9 | 17 |
| 70 | 5 | 7 | 12 |
| 60 | 3 | 3 | 6 |
| 59 | 0 | 2 | 2 |
| | $\frac{1811}{22}$ | | 81.8 |

100

53

823 81.3

$\frac{2195}{27}$

This exam ran a bit long.

Delete APCA requirement.
This isn't much but is easily overlooked.
If not overlooked it seems "break the stride."

Delete requirement of PICT.
APICT is really only necessary for SSA students.
APICT ~~they~~ helps for IC after establishing RTS. most didn't use ~~this~~ SOH CAH TOA ~~feature~~

**Honors Trigonometry** Name Trig Ch5 1990

Copy the original problem. Per _____ Date 93, 97

Convince *me* that **you** understand the concept.

# CHAPTER #5

You are allowed to **use your calculator for Section I *only*.**

**I** Find the area of the triangle(s) defined by the given information. Also, find all missing parts. Round lengths to nearest 100th and degrees to nearest minute. (15 pts ea)

A) $a = 10$, $b = 15$, $c = 20$

B) $a = 12$, $b = 20$, $C = 30°$

C) $A = 38°$, $B = 25°$, $b = 15$

D) $a = 7$, $b = 9$, $A = 35°$

E) $a = 3$, $b = 4$, $c = 5$

**II** Solve $\forall\ \theta\ \varepsilon\ 0° \le \theta < 360°$

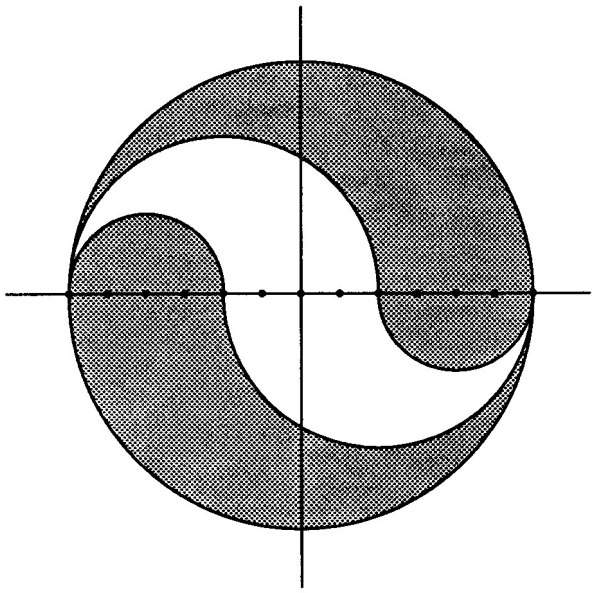
$$\sec^2 2\theta + \tan 2\theta = 1$$ (15 pts)

**III** Solve $\forall\ \theta\ \varepsilon\ 0° \le \theta < 360°$

$$\cot\theta \tan 2\theta = 3$$ (10 pts)

Extra Credit 5 pts

Obviously the upper shaded area is the same as the lower shaded area. Prove the center, white area is less than, more than, or equal to either of the shaded areas AND by how much?



**Honors Trigonometry** Name Trig Ch5 1990

Copy the original problem. Per _____ Date 93, 97

Convince *me* that **you** understand the concept.

# CHAPTER #5

You are allowed to **use your calculator for Section I *only*.**

**I** Find the area of the triangle(s) defined by the given information. Also, find all missing parts. Round lengths to nearest 100th and degrees to nearest minute. (15 pts ea)

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B) $a = 12$, $b = 20$, $C = 30°$

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D) $a = 7$, $b = 9$, $A = 35°$

E) $a = 3$, $b = 4$, $c = 5$

**II** Solve $\forall\ \theta\ \varepsilon\ 0° \le \theta < 360°$

$$\sec^2 2\theta + \tan 2\theta = 1$$ (15 pts)

**III** Solve $\forall\ \theta\ \varepsilon\ 0° \le \theta < 360°$

$$\cot\theta \tan 2\theta = 3$$ (10 pts)

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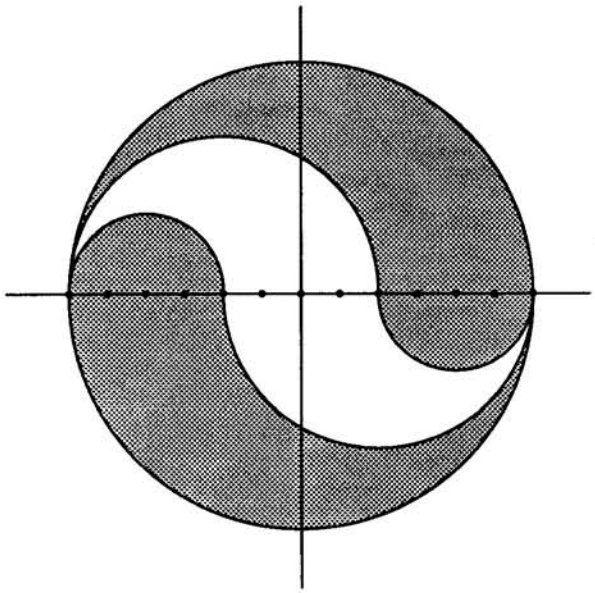
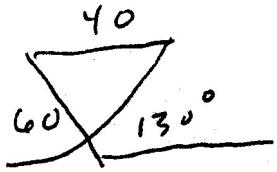


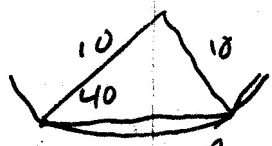
# I

A)




NO Δs c < b

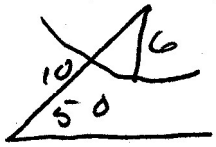
B)




1 isosceles Δ

b sin A ≈ 6.4

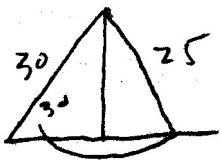
C)




b sin A = 10(.766)
= 7.66

NO Δ

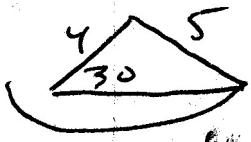
d)




b sin C = 30 · ½ = 15

2 Δs

e)

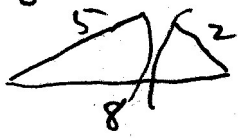



1 Δ c > b

f) a = 5 NO Δ

b = 2 5 + 2 < 8

c = 8

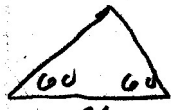



G) A = 38 NO Δ

B = 60 Δs must add to 180°

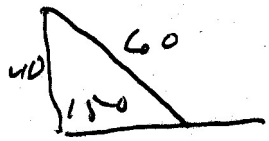
C = 50

H)



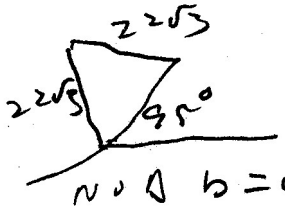

1 equilateral Δ

I

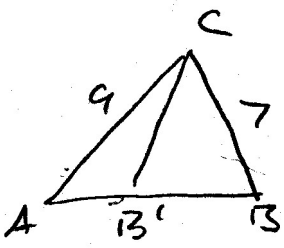



1 Δ

J)




NO Δ b = a




# II

✓A = 35°

B = 47 31

B' = 132 29

C = 97 29

C' = 12 31

✓a = 7

✓b = 9

c = 12.1

c' = 2.64

AREA 31.23

6.81

$\frac{\sin A}{a} = \frac{\sin B}{b}$

$\frac{\sin 35}{7} = \frac{\sin B}{9}$

$.0819 = \frac{\sin B}{9}$

sin B = .7375

B = 47 31

B' = 132 29

C = 97 29

C' = 12 31

$\frac{a}{\sin A} = 12.20 = \frac{c}{\sin C} = \frac{c'}{\sin c'}$

c = 12.1

c' = 2.64

b sin A = 4.59

Area $= \frac{1}{2}(9)(12.1)\sin 35 =$ 31.23

$= \frac{1}{2} 9(2.64)\sin 35 =$ 6.81

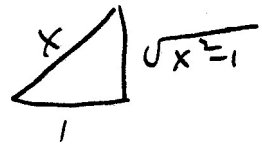
Perimeter 28.1

18.64

Lots of work -3
Little work -4

III

A) $\sec\theta = x$




$\sin 2\theta = 2\sin\theta\cos\theta$

$2\,\frac{\sqrt{x^2-1}}{x}\cdot\frac{1}{x}$

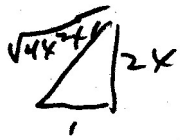
$\frac{2\sqrt{x^2-1}}{x^2}$

B) $\sec^2\theta = x$

$\cos^2 2\theta + \sin^2 2\theta = 1$

Heston identity

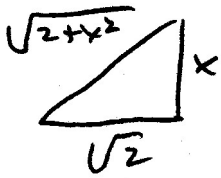
C) $\tan\theta = 2x$




$\sin^2\theta = \frac{(2x)^2}{(\sqrt{4x^2+1})^2}$

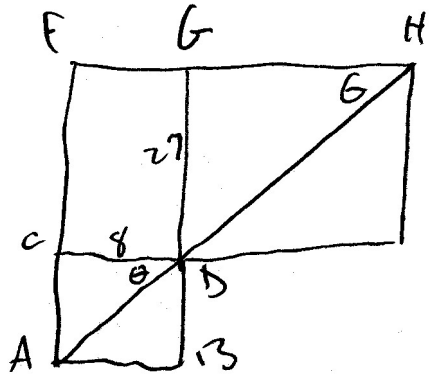
$= \frac{4x^2}{4x^2+1}$

D) $\sin\theta = \frac{x}{\sqrt{2+x^2}}$




$\cos\theta = \frac{\sqrt{2}}{\sqrt{2+x^2}}$

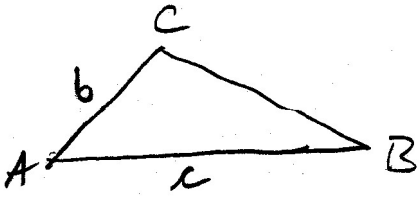
IV




$\frac{DH}{27} = \csc\theta \qquad \frac{AD}{8} = \sec\theta$

$AH = 27\csc\theta + 8\sec\theta$

Extra




$bc\,\underbrace{\sin\frac{A}{2}\cos\frac{A}{2}}$

$\frac{1}{2}\,\underbrace{2\sin\frac{A}{2}\cos\frac{A}{2}}_{\sin A}$

must be explicit in students answer

$\frac{1}{2}\,bc\sin A$

$\frac{1}{2}$ base height

$\frac{1}{2}\,c\,b\sin A$

change I & to be type

| | 4 | 5 |
|---|---|---|
| 100 | 1 | 1 |
| 90 | 9 | 3 |
| 80 | 7 | 12 |
| 70 | 2 | 8 |
| 60 | 1 | 1 |
| 59 | 1 | 0 |

100

57

$\frac{1816}{21}$ $\frac{2048}{25}$ $\frac{3064}{46}$

86.5 81.9 84

Honors Trigonometry
Copy original problem.
Convince *me* that **you** understand the concept!

Name Trig ch5 98

Per _____ Date _____

# Chapter 5 Exam

**I** State whether there are none or one or two or more triangles possible from the given information. **Do not** actually solve for *any* missing parts. You are to *include a picture* and a **brief statement** supporting your conclusion. (5 pts ea)

A) $C = 130°$, $c = 40$, $b = 60$

B) $B = 40°$, $b = 10$, $c = 10$

C) $A = 50°$, $a = 6$, $b = 10$

D) $C = 30°$, $c = 25$, $b = 30$

E) $C = 30°$, $c = 5$, $b = 4$

F) $a = 5$, $b = 2$, $c = 8$

G) $A = 38°$, $B = 60°$, $C = 90°$

H) $C = 60°$, $a = 8$, $b = 60°$

I) $A = 150°$, $a = 60$, $c = 40$

J) $B = 95°$, $a = 22\sqrt{3}$, $b = 22\sqrt{3}$

**II** You *will* solve the triangle in this section. Find all missing parts. Find area and perimeter. (20 pts tot)

Given: $a = 7$ $b = 9$ $A = 35°$. ~~Decimal (if any) must be accurate to 3 places.~~

**III** Without using a calculator, determine the following (simplify, of course). (5 pts ea)

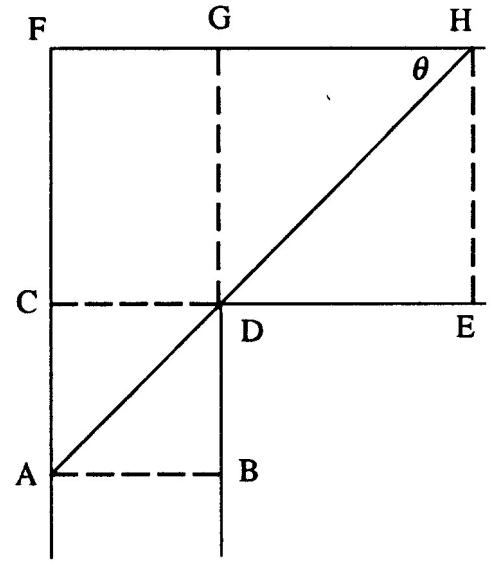
A) Given: $\sec\theta = x$. Determine $\sin 2\theta$.

B) Given: $\sec^2\theta = x$. Determine $\cos^2 2\theta + \sin^2 2\theta$.

C) Given: $\tan\theta = 2x$. Determine $\sin^2\theta$.

D) Given: $\sin\theta = \dfrac{x}{\sqrt{2+x^2}}$. Determine $\cos\theta$.

**IV** Consider the figure. All lines which look parallel are parallel. All lines which look perpendicular are perpendicular. AB = 8. EH = 27. AH is a straight line which is composed of the lines AD and DH. Determine the length of the lines AD and DH. That is, find the length of AH in terms of $\theta$. (10 pts)
(hint: Your calculator is of no help on this problem.)




**Extra Credit** **5 pts**

Show that the area of *any* trangle ABC can be given by: Area $= bc\sin\dfrac{A}{2}\cos\dfrac{A}{2}$

12/11/96

The Quiz given a week before the EXAM was essential. Those who studied it, remembered the Sohcahtoa Problems. 1991

| | | |
|---|---|---|
| 100 | 0 | 98 |
| 90 | 7 | |
| 80 | 7 | |
| 70 | 7 | |
| 60 | 5 | |
| 59 | 1 | 40 |

| | 2 | 5 | T | |
|---|---|---|---|---|
| 100 | 0 | 1 | 1 | 103 |
| 90 | 1 | 3 | 4 | |
| 80 | 3 | 9 | 12 | |
| 70 | 10 | 5 | 15 | |
| 60 | 1 | 0 | 1 | |
| 59 | 1 | 2 | 3 | 51 |

79.45 77.94

$\frac{1217}{16}$ $\frac{1589}{20}$ $\frac{2806}{36}$

76.06 75.75

~~73.88~~.

$\frac{2122}{29} = 73$

The month of July Duty did hurt the scores — but the New Handout was good. may be I should figure out how many Δs there are and add in the bermuda triangle and impossible Δ and see if anybody gets my count.

Quiz would have helped

If we have "extra" days next year, add in a ditto of Sohcahtoa Problems. that would raise the average to mid 80s.

MAKE the changes as shown on the 96 Versions.

# I

A)

A $28^{57}$
* a = 10
B $46^{34}$
* b = 15
C $104^{29}$
* c = 20

$100 = 225 + 400 - 600\cos A$

$.875 = \cos A$

$A = 28^{57}$

$225 = 100 + 400 - 400\cos B$

$\frac{-275}{-400} = \cos B$

$B = 46^{34}$

$400 = 100 + 225 - 300\cos C$

$\frac{75}{-300} = \cos C$

$C = 104^{29}$

B)

* A = 30°
a = 11.33
B 32
* b = 12
C 118
* c = 20

$a^2 = 144 + 400 - 480\cos 30$

$= 544 - 415.692$

$a^2 = 128.31$

$a = 11.33$

$c^2 = a^2 + b^2 - 2ab\cos C$

$400 = 128.31 + 144 - 24(11.33)\cos C$

$\frac{127.69}{-271.92} = -.4696$

$C = 118°$

$b^2 = a^2 + c^2 - 2ac\cos B$

$144 = 128.31 + 400 - 2(20)(11.31)\cos B$

$\frac{-384.31}{-453.2} = \cos B = .8480$

$B = 32°$

C)

* A 38
a 21.85
B 117
b 31.62
* C 25
* c 15

$180 - 63 = 117$

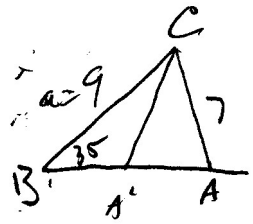
$\frac{a}{\sin 38} = \frac{15}{\sin 25} = 35.49$

$a = 21.85$

$\frac{b}{\sin 117} = 35.49$

$b = 31.62$

D)




A = $47^{31}$
A' = $132^{29}$
* a = 9
* B = 35°
* b = 7
C = $97^{29}$
C' = $12^{31}$
c = 12.1
c' = 2.64

$\frac{c}{\sin C} = \frac{7}{\sin 35} = \frac{c'}{\sin C'}$

c = 12.1  c' = 2.64

$\frac{\sin B}{b} = \frac{\sin A}{a}$

$\frac{\sin 35}{7} = \frac{\sin A}{9}$

$.0819 = \frac{\sin A}{9}$

$\sin A = .7375$

$A = 47^{31}$

$A' = 132^{29}$

$C = 97^{29}$

$C' = 12^{31}$

E)

A = 90°
* a = 5
B $53^{8}$
* b = 4
C $36^{53}$
* c = 3

$c^2 = a^2 + b^2 - 2ab\cos C$

$9 = 25 + 16 - 40\cos C$

$\frac{-32}{-40} = .8 = \cos C$

$C = 36^{53}$

$b^2 = a^2 + c^2 - 2ac\cos B$

$16 = 25 + 9 - 30\cos B$

$\frac{-18}{-30} = \cos B = .6$

$B = 53^{8}$

$a^2 = b^2 + c^2 - 2bc\cos A$

$25 = 16 + 9 - 24\cos A$

$\cos A = 0$  $A = 90$

II $\sin\theta + \cos\theta - 1 = 0$

$\sin\theta = 1 - \cos\theta$

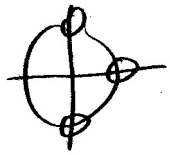
$\sin^2\theta = \cancel{1} - 2\cos\theta + \cos^2\theta$

$\cancel{1} - \cos^2\theta =$

$2\cos^2\theta - 2\cos\theta = 0$ improper method $-10$

$2\cos\theta(\cos\theta - 1) = 0$

$\theta \in \{0, 90, 270\}$



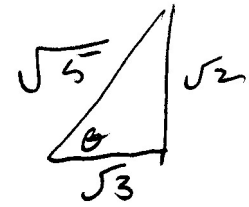
| $\theta$ | |
|---|---|
| 0 | $0 + 1 - 1 = 0$, $0 = 0$ |
| 90 | $1 + 0 - 1 = 0$, $0 = 0$ |
| 270 | $-1 + 0 - 1 = 0$, $-2 = 0$ Rejected. |

Not checked $-5$

$\theta \in \{0, 90\}$

III $\tan^2\theta = \frac{2}{3}$ $\quad 0 \le \theta < 90$

$\therefore \tan\theta = \frac{\sqrt{2}}{\sqrt{3}}$




$\sin(\theta - 90) =$

$\sin\theta\cos 90 - \sin 90\cos\theta$

$\underbrace{0 - \cos\theta}$

$-\cos\theta$

$-\left(\frac{\sqrt{3}}{\sqrt{5}}\right) =$

$-\frac{\sqrt{15}}{5}$

Extra

$\sqrt{5}, \sqrt{11}$ 4

Decimal ans = 0 pts. "NOT EXACT"

notice that $\sqrt{5}^2 + \sqrt{11}^2 = 4^2$

so $\Delta$ is RT $\Delta$.

Area is $\frac{1}{2}$ product of legs

4 is longest so it is hypot.

so ... $\frac{1}{2}\sqrt{55}$ = Area of $\Delta$.

$3.708099 = \frac{\sqrt{55}}{2}$

12/14/99

| | 4 | 5 |
|---|---|---|
| 100 | 1 | 2 |
| 90 | 5 | 11 |
| 80 | 13 | 6 |
| 70 | 4 | 2 |
| 60 | 1 | 0 |
| 59 | 1 | 2 |

102

40

$\frac{2080}{25}$ $\frac{1991}{23}$ $\frac{4071}{48}$

83.2 86.6 84.8

An outstanding exam!

The areas "exact" in VI and on the extra is what made it!

Miss 2As in I D −10

have 2As when there wasn't 2 −10

I am most satisfied with this exam.

# Honors Trigonometry

Name TRIG Ch 5

Per _____ Date 99

Copy original problem.

Convince *me* that **you** understand the concept!

## Chapter 5 Exam

# I

For each of the following, find all missing parts. Use 3-place decimals and don't round early! Angles are to accurate to the nearest minute. (Hint: all triangles exist) (15 pts ea)

A) a = 10, b = 15, c = 20

B) b = 12, c = 20, A = 30°

C) A = 38°, C = 25°, c = 15

D) b = 7, a = 9, B = 35°

E) a = 5, b = 4, c = 3

# II

Solve $\forall\ \theta\ \varepsilon\ 0^\circ \le \theta < 360^\circ$ (15 pts)

$$\sin\theta + \cos\theta - 1 = 0$$

# III

Given $0^\circ \le \theta < 90^\circ$, and $\tan^2\theta = \frac{2}{3}$. Find the *exact* value of $\sin(\theta - 90^\circ)$ (ie. no decimals) (10 pts)

**Extra Credit ---------- 5 pts ----------**

Find the *exact* area of the triangle with sides of: $\sqrt{5}$, $\sqrt{11}$, and 4. Explain.

a) ~~$\sin x 2x$~~

$$\frac{\sin 2x}{1-\cos 2x} = \tan x$$

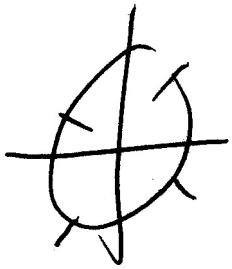
$$\frac{2\sin x\cos x}{1-\cos^2 x+\sin^2 x} =$$

$$\frac{2\sin x\cos x}{2\sin^2 x} =$$

$$\frac{\cos x}{\sin x} = \tan x$$

$$\tan^2 x = 1$$

$$\tan x = \pm 1$$



b)

$$\frac{\sin 2x}{1+\cos 2x} = \tan x$$

Identity

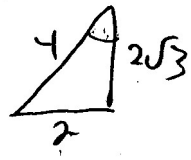
$x \neq \left\{\frac{\pi}{2}, \frac{3\pi}{2}\right\}$

c) Did you get the same answer for parts a and b? Are you surprised?

No and No.

I

a)




$a = 2$

$b = 2\sqrt{3}$

$c = 4$

$A = 30$

$B = 60$

$C = 90$

30 - 60 - 90

side opp

30° ∡ must Be

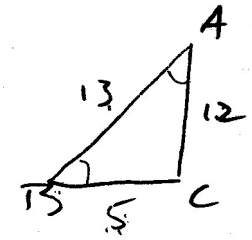
∡ A

$\text{Area} = \frac{1}{2} bh$

$= \frac{1}{2} \cdot 2 \cdot 2\sqrt{3}$

$= 2\sqrt{3}$

b)




$a = 5$

$b = 12$

$c = 13$

$A = 22.^{37}$

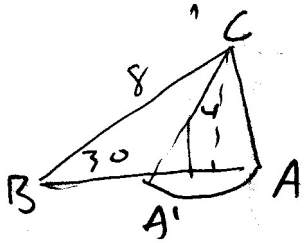
$B = 67^{23}$

$C = 90$

$\text{Tan } B = \frac{12}{5} = 67.380$

$\text{Tan } A = \frac{5}{12} = 22.619$

c)




★ $a = 8$

★ $b = 5$

$c = 9.9$

$c' = 3.9$

$A = 53.8$

$A' = 126^{52}$

★ $B = 30$

$C = 96^{52}$

$C' = 23^{08}$

area 19.8

7.8

$\frac{\sin A}{a} = \frac{\sin B}{b}$

$= \frac{\sin 30}{5} = \frac{1}{10}$

$\sin A = \frac{8}{10}$

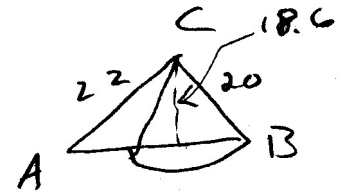
$A = 53^{08} \rightarrow 126^{52}$

$\therefore C = 96^{52} \rightarrow C = 23^{08}$

$\frac{c}{\sin 96^{52}} = 10$ $\quad \frac{c'}{\sin 23^{08}} = 10$

$c = 9.928$ $\quad c' = 3.929$

D)




★ $a = 20$

★ $b = 22$

$c = 19.1$

$c' = 4.4$

★ $A = 57^{40}$

$B = 68^{21}$

$B' = 111^{39}$

$C = 53^{59}$

$C' = 10^{41}$

$\frac{\sin 57^{40}}{20} = \frac{\sin B}{22}$

$\sin B = .9294$

$B = 68^{21}$

$B' = 111^{39}$

$C' = 10^{41}$

$\frac{20}{\sin 57^{40}} = \frac{c}{53^{59}} = \frac{c'}{\sin 10^{41}}$

$23.67 = \overline{.8088}$

$c = 19.145$

$c' = 4.38796$

$\text{Area} = \frac{1}{2}(19.1)(18.6)$

$177.63$

$\frac{1}{2}(4.4)(18.6) = 40.92$

E) $a = 5$

$b = 3.1$

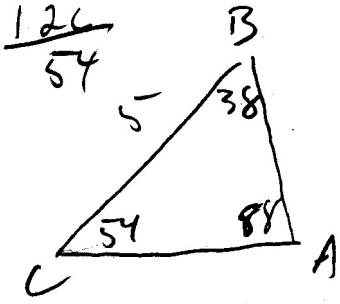
$c = 4.0$

$A = 88$

$B = 38$

$C = 54°$

$$\begin{array}{r} 180 \\ 126 \\ \hline 54 \end{array}$$




$$\frac{c}{\sin 54} = \frac{5}{\sin 88} = 5.003$$

$c = 4.048$

$$\frac{b}{\sin 38} = 5.003$$

F) $a = 5$

$b = 6$

$c = 4$

$A = 55^{46}$

$B = 82^{49}$

$C = 41^{25}$

$a^2 = b^2 + c^2 - 2bc\cos A$

$25 = 36 + 16 - 48\cos A$

$52$

$\cos A = .5625$

$A = 55^{46}$

$b^2 = a^2 + c^2 - 2ac\cos B$

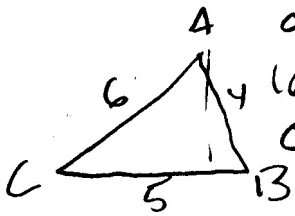
$36 = 25 + 16 - 40\cos B$

$B = 82^{49}$

$c^2 = a^2 + b^2 - 2ab\cos C$

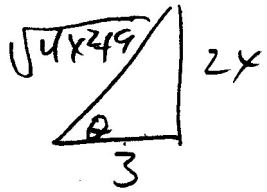
$16 = 25 + 36 - 60\cos C$

$c = 41^{25}$




II

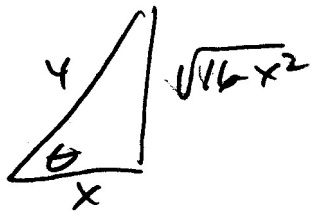
1) $\tan\theta = \frac{2x}{3}$




$$\csc^2\theta = \left(\frac{\sqrt{4x^2+9}}{2x}\right)^2$$

$$= \frac{4x^2+9}{4x^2}$$

B) $\cos\theta = \frac{x}{4}$




$\sin 2\theta =$

$2\sin\theta\cos\theta$

$$\cancel{2} \cdot \frac{\sqrt{16-x^2}}{\cancel{4}2} \cdot \frac{x}{4}$$

$$\frac{x\sqrt{16-x^2}}{8}$$

**Honors Trigonometry** Name Ch 5 Trig

Copy original problem. Per _____ Date _____

Convince *me* that **you understand the concept!**

# Chapter 5 Exam

## I

For each of the following: (Rond lengths to nearest tenth and degrees to nearest minute.) (15 pts ea)

1) Draw an appropriate picture.
2) Find all missing parts.
3) Find the area.

A) $a=2$, $b=2\sqrt{3}$, $c=4$

B) $a=5$, $b=12$, $c=13$

C) $a=8$, $b=5$, $B=30^\circ$

D) $a=20$, $b=22$, $A=57^\circ 40'$

E) $a=5$, $A=88^\circ$, $B=38^\circ$

F) $a=5$, $b=6$, $c=4$

## II

Draw a properly labeled picture justifying your conclusing: (5 pts ea)

A) Given $\tan\theta=\frac{2x}{3}$ find $\csc^2\theta$

B) Given $\cos\theta=\frac{x}{4}$ find $\sin 2\theta$